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METER RATES

What a Man of Many Years' Practical Experience Thinks of the Meter System - It Is the Only Just Way to Sell Water

*By John B. Heim**

OUR annual gatherings are not only an outing, but a school of instruction. We come to learn from each other of the experiences gained during the time since last we met—of the obstacles we encountered and how we overcame them. We renew our friendship. Increase the number of our friends. We exchange the thoughts uppermost in our minds as to how we can better our work entrusted to us by a confident community. We learn and instruct. Some of us express our minds on the floor of the convention, in presenting ideas, views, experiences and successful accomplishments, either in talk or manuscript, give them for the benefit of the association. Others in conversation with brotherly tendencies, so, that when we return home, it is with renewed vigor and better equipment to battle with another year's work.

During the winter of 1903 we had a contest in our city regarding meter rates. The contention was that there should be a so-called flat rate. I would call it a uniform rate, as it is the same rate per 100 cubic feet or gallons for the large or small consumer. The word *flat* rate is a misnomer. Webster gives the explanation of flat rate as follows: "To flat out, to fall from a promising beginning; to make a bad ending; to disappoint expectations." That would be the correct definition with us, should we have adopted the flat rate. As it is, this discontented agitation of the meter rates lost us one of our large consumers, and indications are that we may lose more. Another contention was that we should dispense with the minimum rate. The amount paid annually should be for only the actual amount of water consumed, regardless of the investment incurred in laying mains and service connections free to the consumer; besides furnishing the meter free, and including the daily service rendered. You might as well sell the coal by the single pound; wood by the stick or sugar by the single ounce, at the same price

as per ton, cord or pound. That would be just as consistent as to sell water by the gallon at the same rate for the large and small consumer without a minimum.

In ye olden times the citizens were obliged to go to the town pump or well, exerted themselves to get and carry the water to their domicile and perhaps unbeknown, paid a tax for this privilege.

In our days the water works system not only pumps the water, but carries it to the individual's fixtures and appliances in his abode for the convenience and comfort of those that desire the commodity at their command. And that at all times whether by day or night and at all seasons of the year. It is the town carrier of the most necessary article at the smallest expense of all public utilities. Aside from that it performs the mission of fire protection free of cost.

The energy demanded in the performance of this duty and the expense incurred is lost sight of by a great many water consumers. It is with them in the purchase of water as with all other purchases. They still go to the market with the basket as of old. They want the best and pay the least. They are niggardly in all their dealings. They envy their brother and still he shall foot their bills. They buy ten cents worth of meat for dinner and are willing to carry it home. But from the water works still more is expected. They want the water and the pressure at any moment of the day for 50 cents a year or even less, when the cost of operation, as in our case in 1902, was on an average of \$4.31 per consumer, without considering the average interest on the investment. All of you I expect have had this same experience with the make up of such individuals, as have all business men.

This class of citizens brought on the agitation with us in Madison. The socialistic and political tendencies commenced to show their heads. The demagogue, ever ready, raised the rich and poor cry.

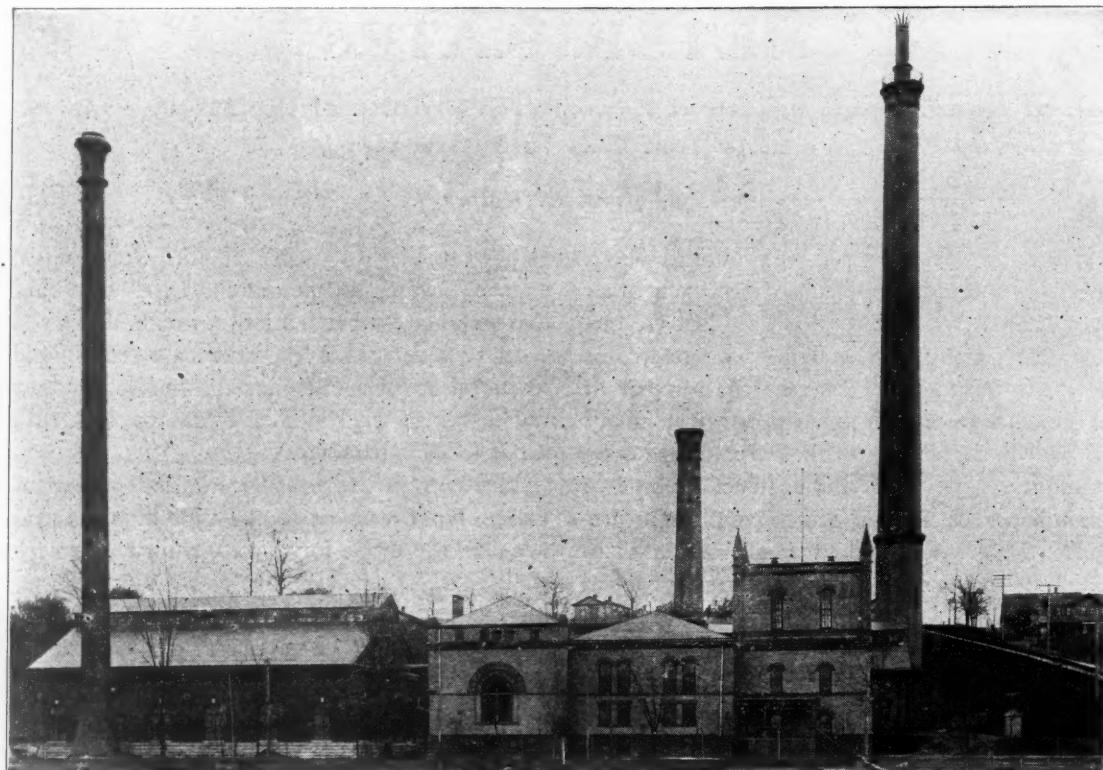
Milwaukee, Wis., with its estimated population of 308,000 and 38,000 consumers, was held up against Madison with

* This valuable paper was prepared by John B. Heim, Superintendent of Water Works, Madison, Wis., and read before the last annual convention of the American Water Works Association at St. Louis, Mo.—EDITOR.

an estimated population of 20,000 and 3,132 water consumers, as the ideal city. Selling its water at a uniform rate of 4½ cents per 100 cubic feet, and without a minimum. The business part of the affair was not allowed to predominate, as how it is possible for Milwaukee to sell water at such a low rate. I will not consider the unfairness of the vast difference of the two cities in population, nor the inexhaustible supply of Lake Michigan against our artesian wells, compelling us to pump our water twice for storage. The cheapness of coal, it being a Lake city. Their pumping station located at the Lake shore, using soft coal at \$2.90 per ton, against our inland city, compelled to use hard coal on account of our pumping station being located in

police department, \$392.00, and \$1.00 each for reading 33,817 meters, \$33,817.00, a total of \$127,755.45, or \$3.36 per consumer. Total average per consumer of \$14.72, against our \$9.34, in favor of Milwaukee of \$5.38. Milwaukee has any number of large takers, and they pay as high as \$37,000.00 per annum. We have only five large takers paying us from \$325.26 to \$587.90 per annum.

Our average operating expenses in 1902 were \$4.36 per consumer, against Milwaukee, \$4.42. Receipts in our case over operating expenses per consumer, \$5.18. Milwaukee, \$10.30. If we had reduced our rate as was contended to 4½ cents per 100 cubic feet, with no other resource or income, we would have received only \$6,289.59, or \$7,271.10



PUMPING STATION OF THE ERIE WATER WORKS, ERIE, PA., AS SEEN FROM THE BAY

the residence portion, paying \$6.98 per ton, an excess of \$4.08 per ton over Milwaukee.

I will consider the income of both cities as a comparison. Our rate was at the sliding scale of from 5 to 20 cents per 100 cubic feet, with a minimum of \$4.50 per annum.

Of the 3,132 consumers, 1,204 paid us only the minimum, or \$5,418.00 for the year. Our total income was only from water rents, as we had no other resource, and amounted to \$29,250.46, an average of \$9.34 per consumer. We pumped 458,850,100 gallons of water. Of this amount 278,000,000 gallons were free water. Milwaukee pumped 4,560,403,162 gallons, furnished no free water. Milwaukee's income from water rents was \$431,832.95, or \$11.36 per consumer. From other sources it received as follows: Street sprinkling, \$15,203.26; laying of water mains, \$38,050.48; taps and branch permits, \$12,633.00; hydrant rental, \$20,824.14; from general city fund, \$6,012.82; fire department, \$782.75;

less than our operating expenses. Whereas under our scale rate we received on an average a trifle less than 8 cents per 100 cubic feet and Milwaukee with its resources received a trifle over 10¾ cents per 100 cubic feet. These authentic facts and figures show that the mere statement that Milwaukee sells its water at 4½ cents per 100 cubic feet without giving the resources of income in addition is all wrong. On Feb. 24, 1904, an article appeared in a paper published at Appleton, Wis., where the contention of the city and the water company was at a high tension, giving copies of water bills paid by citizens of Milwaukee, which had been published by the *National Democrat* of Sheboygan, Wis., and claimed were received from the water registrar of Milwaukee and on exhibition in the office, that read as follows:

WATER RENT FOR THREE MONTHS

Residence, No. 1214 Richards street	\$0.59
Flat containing seven families, No. 2968 1st Ave....	1.83

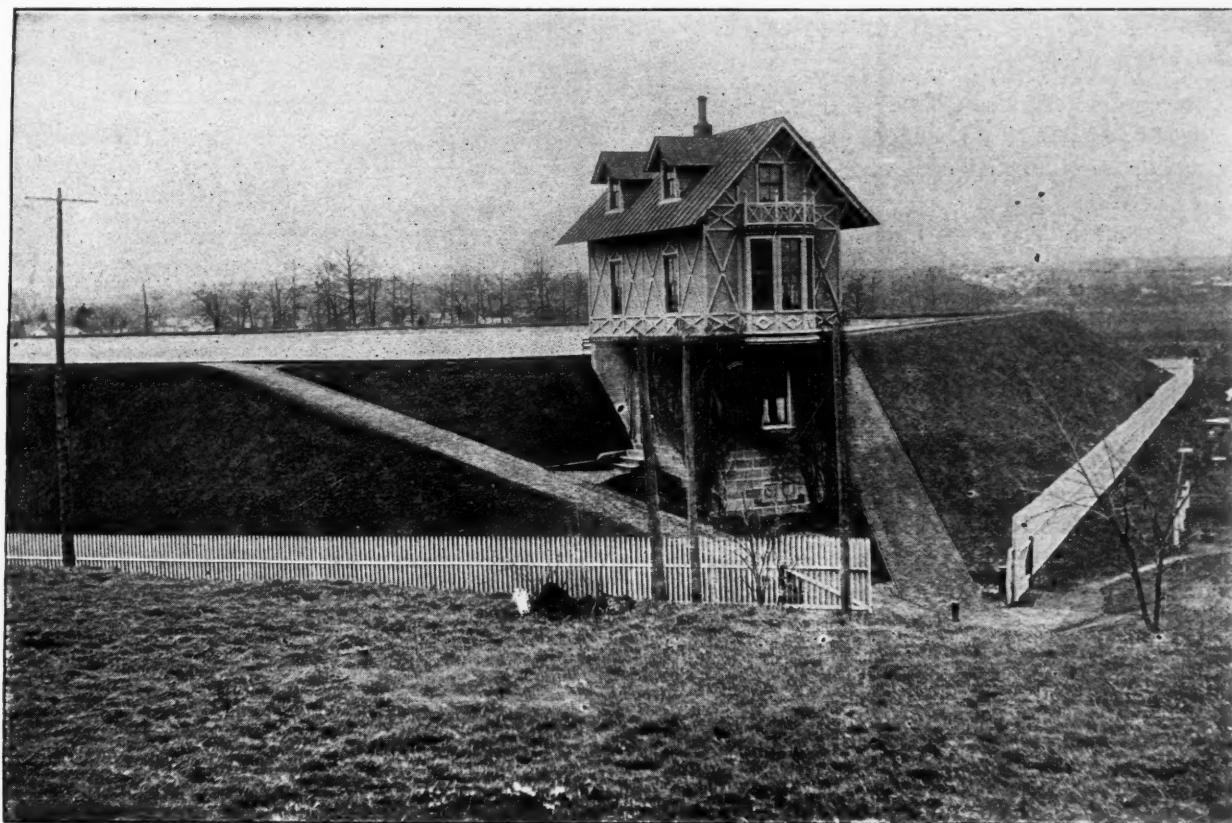
Tenement, No. 458 Lapham street .....	.30
Tenement, No. 903 Bartlett street .....	.43
Tenement, No. 854 Newhall street .....	.57
Tenement, No. 755 Booth street .....	.75

These bills do not show the charge of meter reading, which should have been added to the bill. Probably the charge of \$1.00 for meter reading is collected once a year. To this should be added when information is sent out the \$3.36 per consumer from other sources paid as a tax, by the property owner. That would make the above bills read respectively, \$6.72, \$11.68, \$5.56, \$6.08, \$6.64 and \$7.36 per annum, a total amount of \$44.04. While with us in

er they recommended a flat rate; their minimum; annual income from water rents; from other sources; operating expenses; kind of fuel; price per ton, etc.

Of these 200 we received 135 answers, 88 of which were very complete. These 88 I have tabulated for the benefit of the members of the association, under the head of water works statistics, to accompany this paper. The chart is 32 x 106 inches, and will remain in the convention hall during the session, and a reduced copy be printed in the Proceedings.

The information given is very concise, giving a complete history of each department. It is authentic and gives



RESERVOIR OF THE ERIE WATER WORKS, ERIE, PA.

Madison the amount would only have been at the minimum of \$4.50 each, or \$27.00 per annum.

This shows the injustice that is done to other water departments, endeavoring to show how cheap water is sold without giving the fullest statement.

The water rent question is what confronts most every water department, laboring under such delusions, and it is the reason why I cover the above instance so fully.

The agitation in our city becoming very marked, a special committee of the Board of Water Commissioners was appointed to look into the matter, to reduce if possible the meter rates and also to consider the question of the minimum rate. To aid the committee in its labors we had question blanks prepared and forwarded them to about 200 water departments, as to their population; water system; source of supply; number of consumers; number of meters; gallons of water pumped for the year; the amount that passed through the meters; what kind of meter rate; wheth-

the name of the informant. It was a very laborious piece of work, and I trust it will be a help to those interested in the doings of other departments, and act as a guide for the future. Of 31 other answers I will give only the amount received per consumer. The main question at issue, to wit, the flat or uniform rate and the minimum, was awaited with a great deal of interest.

Of all the answers received, only eighteen favor a flat rate. Two others have a flat rate, but favor a scale rate and most of the eighteen use meters only for large consumers.

Some of those that answered *No* to a flat rate emphasized their opinion in the following language:

"No! I think it should be graduated."

"No! Decidedly no."

"No! With us it would not be practicable."

"No! We would lose our large consumers,"

"No! I would not recommend it."

"No! Not for cities of our size. (Population, 10,000.)

"No! The large consumers' rate must be lower.

"No! Manufacturers should have a special rate.

"No! We think the scale rate works well for all.

"No! Do not believe it fair or expedient.

"No! On sliding scale only.

"No! Not for our city.

"No! Never.

"No! Think the scale rate better.

"No! Not if works are self sustaining.

"No! My preference would be for a sliding scale.

"No! Not yet.

"The subject interests me. I have not arrived at the point of making a recommendation.

"No! Think it impracticable.

"No! We favor large consumers.

"No! Considerable argument both sides.

"No! Graded according to amount used.

"This is a big question and could hardly be answered the same for two cases.

"No! Large consumers should have the benefit of lowest rate on sliding scale."

F. H. Crandall, Superintendent of Water Works, Burlington, Vt., answered: "We found, on investigation some few years ago, that a flat rate, yielding about our present income, would furnish to the large number of small takers all the water they were in the habit of using for less than cost of meter and service maintenance. As the Commissioners were of the opinion that the furnishing of water to the smaller takers at less than cost, and at the expense of the larger takers, was no more reasonable and right than the furnishing to the large takers of water at less than cost and at the expense of the smaller takers, the flat rate was not adopted, but instead a sliding scale, so worded as to afford no opportunity for larger quantity of water being obtained for no increased assessment, with a minimum rate clause."

Of eighteen that favored a flat rate, five emphasized their answers as follows:

"Yes! Except for railroads.

"Yes! Appears to be satisfactory.

"Yes! All except manufacturers.

"Yes! It being the citizens' plant. Yes.

"Yes! It would seem to be a just thing to do, where plant is owned by the city."

All of the five above have a minimum rate of from \$4 to \$10 per annum, which does not harmonize with a flat rate.

Three cities favor a flat rate that have no premium, viz: New Britain, Conn., with a rate of 7 cents per 100 cubic feet, 40 per cent. taps metered. Milwaukee, Wis., a rate of 4½ cents per 100 cubic feet, \$1 extra for reading the meter, and a resource of \$127,755.45, 90 per cent. metered. Cincinnati, Ohio, with a rate of from 6½ to 8 cents per 100 cubic feet (which is not a flat rate), a resource of \$54,644.84, and four large consumers varying from \$7,600 to \$25,000 per annum, only 8¾ per cent. metered. Detroit, Mich., says yes! and has a sliding scale from 2½ to 6 cents per 1,000 gallons. Received from general tax, \$75,000, and from other sources \$33,388.03, a total of \$108,388.03; with a minimum rate of \$7 per annum (which does away

with a flat rate), only 10 per cent. metered. Manchester, N. H., says yes! and has a flat rate of 12½ cents per 100 cubic feet. Receives a hydrant rental from the city of \$19,200, and has a minimum of \$10 per annum, 65 per cent. metered. Yonkers, N. Y., says yes! and has a flat rate of 15 cents per 100 cubic feet. Received a hydrant rental of \$23,880, has several large consumers, ranging as high as \$12,630, and a minimum of \$4 per annum, 100 per cent. metered. Spokane, Wash., says yes! Has a flat rate of 15 cents per 1,000 gallons, a minimum of \$18 per annum. Meter percentage not given. The minimum would indicate only large consumers are metered. New Brunswick, N. J., says yes! Has a flat rate of 10 cents per 100 cubic feet. Received a hydrant rental of \$11,700, and has a minimum of \$10 per annum, only 1 per cent. metered. Meadville, Pa., says yes! Has a scale rate of from 5 to 15 cents per 100 cubic feet. Has a minimum of \$5 per annum, 10 per cent. metered. Question must have been misunderstood. Los Angeles, Cal., says yes! Has a flat rate of 7 cents per 100 cubic feet. Minimum and per cent. metered not given. Lynn, Mass., says yes! Has a flat rate of 15 cents per 100 cubic feet, and a minimum of \$10 per annum; 25 per cent. metered. Grand Rapids, Mich., says no! It has a flat rate of 5 cents per 100 cubic feet and a minimum of \$5 per annum; 20 per cent. metered. Minneapolis, Minn., says no! Has a flat rate of 6 cents per 100 cubic feet. A minimum of \$4 per annum; 33 1-3 per cent. metered. A water department that collects a minimum I do not consider it strictly under a flat rate. Certainly not one that has a scale rate and a minimum.

Of the 88 answers as to minimum, 69 cities have a minimum ranging from \$3 to \$24 per annum. One city's minimum is up to \$40, another up to \$100 per annum.

Seven cities have no minimum and eleven cities failed to answer the question.

Buffalo, N. Y., has the lowest meter rate, varying from ½ to 4½ cents per 100 cubic feet. Only 2 per cent. metered, a minimum of \$24 showing that only manufactures are metered. Besides it received a hydrant rental of \$70,500 per annum. Albany, N. Y., has a scale rate of from 3¾ to 6 cents per 100 cubic feet; 17 per cent. is metered. Received \$10,254.96 from other sources. Has one large consumer that pays \$30,000 per annum and has a minimum of \$5 per annum. Providence, R. I., is one of the cities that has the best financial results. It sells water at from 12 to 15 cents per 100 cubic feet. Received \$31,397.31 from other sources. The receipts from its large consumers vary from \$1,000 to \$30,000. It has a minimum of \$10; 82 per cent. metered. The amount collected from 22,758 consumers amounted to an average of \$28.60 per consumer per annum. Sedalia, Mo., is still better. The meter rate is 12½ to 30 cents per 100 cubic feet. Received \$10,600 hydrant rental; 10 per cent. metered. The average per taker received was \$50.90 per annum.

This gives you a fair idea of the variance and financial results of different water departments. The perusal of the statistics given on the chart will give you further information. I have also tabulated the 31 cities mentioned, incomplete for the chart, but worthy of consideration in the financial results. I give the estimated population, the average



SWIMMING POOL AT PUMPING STATION OF ERIE WATER WORKS, ERIE, PA.

amount received per taker from the water rents; other resources and the total average per consumer.

Place.	Pop.	Av. Amt. Water Rent.	Av. Amt. other sources.	Tot. Av. Amt. rec'd per consumer
Columbus, Wis...	2,400	\$10.27	\$8.34	\$18.51
Austin, Minn...	6,000	9.02	...	9.02
Yarmouth, Nova Scotia	6,500	18.80	2.97	21.77
Trinidad, Col.	7,500	22.43	6.51	28.94
Goshen, Ind.	9,000	5.59	23.70	29.29
Grand Island, Neb.	9,000	16.66	...	16.66
Mason City, Iowa	9,000	12.50	3.12	15.62
Ispeming, Mich.	15,000	7.56	...	7.56
Cloverville, N. Y.	19,000	12.18	.03	12.21
Concord N. H.	19,632	17.11	2.23	19.34
Poughkeepsie, N. Y.	24,400	10.73	.40	11.13
Hamilton, Ohio	25,000	8.60	1.02	9.62
Newburgh, N. Y.	25,000	9.65	.05	9.70
Gloucester, Mass.	29,000	14.00	2.68	16.68
Colorado Springs, Col.	30,000	15.00	...	15.00
Fitchburg, Mass.	32,000	14.30	...	14.30
Jacksonville, Fla.	33,000	15.00	5.62	20.62
Auburn, N. Y.	35,000	13.63	3.63	17.26
Atlantic City, N. J.	36,000	22.58	5.53	28.51
Binghamton, N. Y.	40,000	11.18	2.32	13.50
Pawtucket, R. I.	40,000	23.62	2.51	26.13
Altoona, Pa.	45,000	7.10	.33	7.43
Fort Wayne, Ind.	50,000	7.10	.59	7.92
Evansville, Ind.	65,000	13.61	...	13.61
Waterbury, Conn.	71,000	31.33	...	31.33
Camden, N. J.	75,000	11.72	...	11.72
Lowell, Mass.	95,000	17.36	...	17.36
Allegheny, Pa.	135,000	12.59	...	12.59
New Orleans, La.	300,000	45.51	13.85	59.36
Cleveland, Ohio	395,000	9.67	.07	9.74
Baltimore, Md.	524,000	7.82	.29	8.11

From all of this information received, considering our city under all conditions, the committee selected, proceeded to work, going over all details. First it considered the rate,

whether a flat or uniform rate, or as heretofore, a sliding scale, should be adopted. It invited the public to a full and free discussion of the subject. The discussion developed such wide and radical differences of opinion, amounting to an apparent antagonism of interest between large and small consumers, that it was only fruitful in stimulating the committee to give the matter the best and largest possible consideration, so that its results and recommendations would meet the approval of the largest possible number of citizens and patrons.

The question of uses of water was first considered and classified into domestic, commercial and public or free and unaccounted for water. The last item was considered as one. The results obtained did not differ materially from the general expression of other cities in the use of free water. Our percentage of such uses being, however, greater than the average. The conclusion arrived at was that the public use should be charged on the whole community and not only on the water consumers. That a sum of \$10,000 of the general taxation should be set aside by the Common Council, to make up the deficiency in the water rents, caused by a reduction in the meter rates. This is not more than fair and just. There is no reason why the water consumers should pay for their own and also contribute their share in water rent for the free water used in public buildings, schools, churches, charitable institutions, street sprinkling and fire protection.

Another injustice to the water consumer is when it compels them to pay for laying of mains and service connec-

tions at the expense of the Water Department out of the water rents. This should be paid out of the general city fund, or by the owner of the property benefited, as in other cities. The next step was the domestic and commercial use, in which enters the large and small consumers, and the proper distribution of the meter rates. The committee approached the matter without bias or prejudice and was unable to escape the conclusion, that the large water consumers are the most profitable to the department under a sliding scale. After weeks of labor the committee came to the following conclusion when it says: "Our present sliding scale rate is the result of the department's efforts to decrease cost of service to all consumers, and is approved by this committee as being founded on equity and good business principles." These rates I formulated in 1896 for the commissioners. It is a satisfaction to have an approval of such scrutiny of the work performed at that time and continued ever since. The committee further says, "From a study of the results obtained under same, we are, however, of the opinion that the consumer who, by lawn sprinkling or free domestic use of water, runs up to \$10 or \$15 per six months, pays rather the most in proportion, and in view of this possible fact, and of other recommendations in the report, and further of our expected increase in the supply of water, we are of the opinion that the present rate of 20 cents per unit for the first 5,000 cubic feet above the minimum be reduced to 13 cents per 100 cubic feet, and recommend such reduction and that the present *sliding scale* be continued in force with above modification, with 5 cents per unit as the lowest price at the end of the scale. The committee feels that this discussion of water rates is elementary and crude, and that it does not add anything of value to the board's information on the subject, but in so far as it confirms the present use of the sliding scale, it is, at least to this committee of the board a satisfaction to know that our past methods are approved by our present judgment, and we trust that the discussion will be received and continued, by the public in a spirit of fairness one to the other, as well to the water board as a whole, and without any attempt to shift the burdens and obligations of modern high living, as there are, after all is said, greater benefits and return from the comparatively small amounts which each one expended or contributed for any other purpose.

Public uses of water should be paid for by an annual addition to the tax levy for the benefit of the water fund, of the sum of \$10,000, or such sum as experience and the judgment of the water board shall determine. We recommend the minimum charge for all water users to be reduced from \$4.50 to \$4 per annum, or 1,500 cubic feet per six months, before any further charge accrues. That the charge of 5,000 cubic feet of water, above the first 1,500 feet per six months shall be at the rate of 13 cents per unit for 100 cubic feet. For quantities over 5,000 feet and up to 20,000, 10 cents for each additional 100 cubic feet, according to our present scale, with 5 cents per 100 cubic feet as the lowest price. That all bills rendered and all receipts given show plainly that computations are made as above."

The recommendations and accompanying schedule of rates by the special committee were adopted unanimously by the board of water commissioners. As an illustration

under the new rate adopted, a bill for 230,000 cubic feet of water for six months would be as follows:

First 1,500 cubic feet (minimum)	\$2.00
Next 5,000 cubic feet, at 13 cents	6.50
Next 15,000 cubic feet, at 10 cents	15.00
Next 208,500 cubic feet, at 5 cents	104.25
Total, 230,000 cubic feet	\$127.75

Under this rate it can be seen that the large consumer pays the same rate as the small consumer until he gets beyond the wants of the small consumer, when the lower rate first takes effect. There is no injustice done in either case. To assure the patrons of this fact, the face of the receipt is printed and filled out according to the consumption of water as illustrated above.

The reduction in rate reduced through the above scale brought our water rents from \$14,127.91 January 1, 1903, to \$11,972.03 at the rent day January 1, 1904. A loss of \$2,158.88 in six months. At the same ratio for the next six months a loss of \$4,311.76 for the year. The common council added the \$10,000 to the tax levy for the benefit of the water fund, so that we are the gainer in the sum of \$5,688.24 through the change.

There is never a change but with it comes a drawback, so it is in our case. We have a great many tenements used for boarding and lodging houses on account of the State university located in our city, with nearly 3,000 students. Under our previous rate the tenant in most instances paid the water rent. Under the new rate, the owner has to pay part of the rent in his taxes. Ninety-six per cent. of our population being water consumers, it was not unfair to collect under the old rate. But under the increase of our macadamized streets, we have 35 miles, and contracts let for three miles more, and a steady increase from year to year, which brings with it an increase of free water. Therefore, it is but meet and just, that a certain sum should be collected in the general tax for the benefit of this free water and placed into the water fund.

The summing up and conclusions arrived at by the examination of the statistics on the accompanying chart, proves to us, as we always believed, that a flat or uniform rate for all takers in a city, or a uniform rate for all water departments of the country, is an utter impossibility and an injustice to compel the same to be done.

The duties to perform, the expense to incur, the source of the water supply and method necessary to furnish the same to the consumer, the different resources of income, the locality, number of consumers, its indebtedness and requirement for a rapid growing city, all enter into the establishment of the meter rate of a well regulated water works system.

A system that receives its water by gravitation, or from a river or lake which requires no filtration can furnish water for less money than where filtration or double pumping to store water is necessary, as in our case. A city with a large contingent fund and only large consumers metered, can sell water at a low uniform rate, as also such that have large resources, to make up the deficiency of the domestic consumers. Another city has to carry its water for miles before it is delivered to the consumer. In another city the

variation of the price of fuel enters into the transaction. A municipality can sell water for a lesser rate than a company, because the city does not have to look for profits. If the rate is too low and it runs short a resource will be created to make up the deficiency. Again, if conditions were alike in New York City, Chicago, Philadelphia, Baltimore, St. Louis, Boston, Milwaukee, Detroit, Cleveland and Indianapolis, the greater number of consumers would create the price. But as it is, each of the above cities must establish a rate to meet their requirements. One cannot be held up to adopt the same rate as the sister city. This same condition enters into all water departments.

Before concluding, let me call your attention to the decision of the Supreme Court of Wisconsin on the minimum water rate, showing the justice and need of such a rate.

Henry Vits, a resident of Manitowoc, Wis., refused to pay for more water than was actually used. The Manitowoc Water Works Company insisted upon collecting the minimum of \$5 per annum, whether meter showed this amount of water used or not. The case was handed to the Circuit Court for decision. The court sustained Henry Vits. An appeal was taken by the water company to the State Supreme Court. The Supreme Court reversed the decision, sustaining the minimum charge.

The syllabus of the decision in The State, ex rel., Vits, respondent, vs. Manitowoc Water Works Company, Appellant, April 25-May 13, 1902, the court reversing the de-

cision of the Circuit Court, reads as follows: "1.—A municipal ordinance granting a franchise to a water works company is not in case of ambiguity, to be construed most strongly against the company, but by the same rules that govern in the construction and interpretation of statutes. 2.—Such an ordinance fixed maximum rates which might be charged to private consumers for certain purposes, proportionate to the above, but the lowest annual rate in any case shall be five dollars. Manufacturing and special uses, rates to be based on quantity of water used. All parties have the privilege of furnishing water meter and paying only for water actually used at rates varying from 20 cents to 30 cents per 1,000 gallons, viz.: consumption less than 1,000 gallons per day, 30 cents," etc. When the ordinance was enacted, meters for domestic consumers were comparatively unknown.

Held, "That the provision relating to meters applied only to takers of water for manufacturing and special uses, and that the minimum for domestic purposes was five dollars."

My summary in the presentation of this paper is, that the best policy to pursue for both the water consumer and the water departments, whether owned and controlled by a municipality or company, to follow the advise of the immortal Washington, the Father of our Country, "*To exercise at all times a sober and dispassionate judgment*," in the metering out and payment of the water rent. The motto should be, "*Live and let Live*."

PROPOSED TRANSFER OF GERMAN RAILWAY LINES*

THE main network of railway lines in a portion of this consular district known as the Rhine Pfalz or Palatinate is at present under private management. The lines, with a total length of about 480 miles, are owned by three distinct companies. Most of the lines are short, and traverse in all directions, a small and somewhat thickly settled area. The lines owned by these separate companies are the Ludwigsbahn, about 219 miles; the Maximilianbahn, 95 miles; the Nordbahn, 166 miles.

Since January 1, 1870, the lines of these three companies have been operated under a single management by virtue of an agreement made in 1869 and to continue for a period of one hundred years, unless in the meantime the State exercises a right reserved to it to purchase the lines. The ownership of each of the three properties remains in the respective company the same as before the agreement was entered into. Each company keeps up its separate organization, and is represented with an agreed voting power in the general meetings of the combined companies.

Under the agreement with the State at the time of the incorporation of the separate companies and their consolidation in 1870, the right is reserved to the State to take the properties at any time after January 1, 1905, by paying a certain price to be determined from the books of the companies. December 12, 1903, was fixed as the date at which

the State was to elect whether it would take the properties from and after January 1, 1905.

The State did not make the election referred to, but since that date has made a proposition to the several companies to take the properties at a price corresponding to the market price of the stocks of the companies, as shown by the Frankfort stock exchange of March 14, 1904, to wit, the stock of the Ludwigsbahn at 219, Maximilianbahn at 138.30, and the Nordbahn at 126½. This proposition was presented and informally discussed at a joint stockholders' meeting of the three companies held on April 29 of this year. While the offer of the State was not accepted, it is deemed not improbable that terms may yet be agreed upon and that the transfer will be made in the near future.

Under a guaranty of the State, the three separate companies now pay dividends of 9 per cent., 5½ per cent. and 4 per cent., respectively, or from 4 to 4½ per cent. on the actual cash value of the stock. The latter is not taxed. This fairly satisfactory income is set forth as a good reason on the part of the stockholders to retain the properties. The State's power to build competing lines or to otherwise reduce the profitableness of these while in private hands is one subject of a somewhat many-sided discussion. Probably the sentiment of bankers and other business men not directly interested in the questions would be favorable to the State taking control of these lines.

* From United States Consul Harris, Mannheim, Germany.

PIPE GALLERIES FOR NEW YORK*

**Frequent Excavations Destroy Newly Laid Pavements—Gas Leakage the Enemy of Asphalt
—Lessons to Be Learned from Experience of Foreign Cities**

By James C. Baylis, M. E., Ph.D.

THE underground engineering of New York presents problems which demand radical and comprehensive remedy. They can be dealt with in no other way. In this sense the term underground engineering is a courtesy designation, since very little of engineering judgment and still less of engineering forethought have entered into the piping of the city for gas and water distribution and like purposes. To meet the conditions of his employment the man entrusted with responsibility for work of this character needs to be an opportunist. The stratum under the pavement available for the accommodation of mains is so crowded in many parts of New York with old mains and new, live mains and dead, electric ducts, sewers, drains and the like, that to find room for another or to maintain those now in place involves the exercise of great ingenuity and recourse to expedients which would be inexcusable if they were not unavoidable. To solve the problems thus presented is to engineer as the guessing of conundrums is to exact mathematics.

STREET EXCAVATIONS

It should require no argument to show that New York cannot be a clean, orderly or beautiful city, nor one comfortable and safe for occupation, until street excavation is minimized. To work which has to be done over and over again, each time with the destruction of costly pavements and the creation of a serious and cumulative public nuisance, it is proper that emphatic objection be offered by every one in whose bosom a spark of civic pride remains alive.

The statistics of street excavation for one purpose or another connected with the laying, replacement, tapping and maintenance of underground conduits, give startling totals. Those for the Borough of Manhattan I have compiled for one year, as follows:

The number of street openings for which no permits were required for the Borough of Manhattan, in 1902, was 3,941. Of these, 2,919 were for access to water mains and 1,022 for access to sewers. The longitudinal street trenching during 1902 was as follows: For laying electric main conductors, 50.38 miles; for new gas mains, 2.42 miles; for steam mains, 142 feet; for salt water mains, 111 feet; for the overhauling of mains, 40.97 miles; for electrical long services, 5.81 miles; total, 99 miles 3,318 feet.

The street openings for subsidiary connections and repairs were: For gas, 14,468; for electrical, 5,467; for steam, 624; for other purposes, 6; total, 20,565.

The condition of the streets of New York has been a scandal and a reproach for years, and especially since the

cobblestones and Belgium blocks of the earlier period of municipal development gave place to the asphalt—the form of pavement which least accommodates itself to the constant excavation necessary to give access to subterranean pipes, ducts, sewers, house drains, service pipes and wires. Bad as are the conditions due to this constant street excavation, those which would arise from the refusal of the municipal authorities to allow it would be incomparably worse. Neglected gas and water leakage, the congestion of sewers, street and house explosions and the restriction of electrical communication would make New York uninhabitable, not merely in a figurative sense, but literally.

It would indicate a very crude and imperfect comprehension of the exigencies of gas and water distribution to assume that any of the street excavation, of which our citizens so justly complain, is done for any other reason than that it is unavoidable in the circumstances. Such excavation is costly, especially as it involves the expense of repaving.

Unfortunately, this emergency arises in most instances very much under a year—sometimes, indeed, as soon as the pavement is laid.

From the point of view of the Department of Water, Gas and Electricity, and even more so from that of private corporations owning mains and conduits, street excavations are in the highest degree burdensome. Their cost would pay satisfactory interest on a very large increase of corporate capitalization, and with the expenses of main maintenance, leakage losses and damage claims minimized, gas franchises and probably electric franchises would enormously increase in value. Without important main leakage New York would have in its present sources of supply in the Croton Valley water enough for the use and waste of certainly twice its present population.

Under the conditions now existing, and which will continue to exist as long as mains and conduits are buried in the ground, such condemnation of our city pavements as was made by the Grand Jury in its presentment of July 28, 1903, is a waste of time and paper.

The question of practical interest is: How can these conditions be corrected? The answer is: They cannot, so long as our pavements are laid over a tangle of decaying and disintegrating pipe lines, to which in the one Borough of Manhattan alone across must be had by a hundred miles of longitudinal trench and more than 20,000 pits and cross-cuts annually. A trench, a pit or a cross-cut cannot be back filled so solidly nor repairing done so perfectly, that it does not locally ruin the pavement in which it is made.

PIPE GALLERIES ABROAD

The pipe gallery is no experiment. In the mass of exact information I have been able to gather concerning the results attending the building and operation of such struc-

* This article is a digest of Bulletin No. 11 of the Municipal Art Society of New York, which has taken up the discussion of practical suggestions for the improvement of civic conditions in New York. Dr. Bayles, the author, has had many years of actual experience at home and abroad, and, therefore, his suggestions are imminently pertinent, many of which are equally applicable to the large and the small municipality.—EDITOR.

tures in Europe, no one fact interests me more than that recorded by Mr. A. Brown, Borough Engineer of Nottingham, England. One of the main thoroughfares of that city is Victoria street. On it stands the General Post Office and many of the principal business buildings, and it has a heavy traffic. In 1866 it was provided with a pipe gallery, in which were grouped the water and gas mains, the sewer and all the high and low tension wires of that thoroughfare. Mr. Brown has assumed professional responsibility for the statement, in a paper before a very critical audience, the British Association of Municipal and County Engineers, that in the twenty-five years following the completion of this work not a stone was lifted from the pavement of Victoria street, and during that time not a penny was spent on repairs of roadway.

Think of what that means! Think of what anything like it would mean to New York! If a pavement in this city remains undisturbed for twenty-five hours it is cause for congratulation; if it should stay so for twenty-five days it would "break the record."

The pipe gallery system of Nottingham was begun in 1861, and has been continued ever since. Its cost has averaged \$88,000 per mile, everything included, and the interest charge to the city over and above the annual rentals collected is 2 per cent. This shows a large economy in the minimized leakage of gas and water, in main maintenance and in repairs and paving costs.

The London pipe galleries were begun in 1861 in a new street opened between Covent Garden and St. Martin's Lane. The system has since been extended as fast and as far as opportunity offered, and is of such conspicuous public benefit that the County Council is committed to the policy of making it part of every scheme of street improvement undertaken under its direction. The details of London practice are of technical rather than popular interest. In design the pipe galleries of that city seem crude and incomplete, and an American engineer would probably hesitate to imitate them in all respects, but they serve their purpose admirably. Some months ago I had a long and instructive conversation—several, indeed—with Mr. Maurice Fitzmaurice, Chief Engineer of the London County Council, covering the whole subject of his pipe gallery experience. I asked how it was that the approval of British electricians could be had for bunching conductors together in troughs and hanging them from pendant and side-wall brackets, and was told that they had no grounds for objection, in that the method had given them no trouble. I asked what happened in the event of crosses and short circuits, and was told that these were of infrequent occurrence, and that nothing happened. I asked what provision was made for draining the galleries to dispose of water which might leak from defective joints or gush from fractured mains, and was told that all the water which ever found its way into them from any source gathered at low points and was removed in pails without inconvenience. I asked about induced ventilation to dispel gas leakage, and was told that none had been provided, for the reason that there was no gas leakage. Permits were freely issued to plumbers to take torch lamps into the tunnels when needed in making connections. I asked Mr. Fitzmaurice if I might smoke in walking through the galleries,

and he assured me that there was not the least objection to my doing so, and that I might strike matches to light my cigarette as often as I needed to. The only rule against smoking applies to workmen, who are not permitted to smoke in working hours, under or above ground.

If time served an instructive comparison might be drawn between these conditions and the annual leakage of some 3,000,000 of cubic feet of gas from buried mains under the relatively impervious pavements of Manhattan.

PIPE GALLERIES FOR NEW YORK

The history of the movement to provide pipe galleries for the principal streets and avenues of New York is well calculated to discourage further effort in this direction. It has thus far been impossible to awaken any intelligent or sustained public interest in this subject, and this apathy has been taken advantage of by corporations jealous of any encroachment upon what they have come to regard as their ownership of the streets of New York and their right to dig in them as freely as one might in his own garden, to defeat legislation, deny appropriations and restrain by injunction the efforts of the Borough President to do something practical. In a very quiet and discreet way these corporations are very potent forces in defeating every movement in the direction of reform which they do not initiate, and the results of which they will not own and control. We shall never have even the beginning of a pipe gallery system in New York until it is demanded by public opinion in terms so unmistakable that it is not susceptible of misinterpretation, and so emphatic that the Mayor, Aldermen and members of the Board of Estimate and Apportionment will not deem it safe to "smile, put the question by."

It should be regarded as a crime against the public interest that pipe galleries were not built in connection with every foot of Rapid Transit Subway thus far constructed. This was not the fault of the Rapid Transit Commission nor of its accomplished Chief Engineer, Mr. William Barclay Parsons. In the report of the Plans Committee just submitted, relative to proposed extensions of the existing system, we find the following:

It has always been the desire of the Board, and so far as legal limitations would permit it has been the policy of the Board, to provide for pipe galleries to accommodate pipes, wires, sewers and other subsurface structures. In the general plan for the rapid transit railroad now under construction, it was expressly provided that along Elm street suitable galleries might be placed at the outside of the exterior tracks, and on April 19, 1900, the Board passed a resolution requiring the contractor to construct such pipe galleries on Elm street, between the south side of Worth street and the north side of Astor place. Such construction was actually begun, and continued until about November 1, 1900, on which date a communication was received from the city authorities, stating it as the opinion of the Departments of Sewers and Water Supply that the interests of the city would be best served by not locating either the sewers or the water pipes in such galleries. It was therefore determined by the Rapid Transit Board, in deference to the views expressed, not to proceed further with such construction.

In order to enable the Board to effectually deal with the subject, legislation will be necessary, which should enable it to provide for the construction of pipe galleries in connection with and as a part of the construction of any proposed new lines wherever the Board, in its discretion, might think such pipe galleries desirable.

Your committee may add that whatever legislation on these subjects may be proposed, they consider it very expedient that separate

bills should be introduced dealing with the separate subjects upon which legislation may be desired, so that if opposition should develop to any particular proposal, the defeat of such proposal would not involve the failure of legislation upon other points to which no opposition developed.

That the opposition here suggested may be expected is very clearly shown by the incidents connected with the effort to provide pipe galleries for lower Broadway, in connection with the section of subway now building from Ann street to Bowling Green. Hon. Jacob Cantor, President of the Borough of Manhattan, eager to identify his administration with the initiation of this important step in municipal progress, secured reports and estimates of the cost of the work to be built coincidently with the construction of the subway. Under what were assumed to be his ample powers he employed an engineer, who made the necessary plans in full detail. An appropriation of \$100,000 for beginning the work was obtained from the Board of Aldermen, and the authorization of a bond issue for the amount deemed necessary for the prosecution of the work during the last quarter of 1903 was secured from the Board of Estimate and Apportionment. At this point it looked very much as if the work was assured. Specifications were prepared and printed and bids invited. On the day the bids were to be opened and the contract let, an injunction was served on the Borough President, returnable the following day on an order to show cause why it should not be made permanent, on the ground that the President of the Borough had no power to build pipe galleries under the charter. The argument was heard, and after a very leisurely consideration, during which time President Cantor had been succeeded in office by the newly-elected Borough President, the injunction was made permanent. And so the matter stands.

It suits those opposed to the plan of pipe galleries in New York to consider them a menace to life and property. As a matter of fact the fear expressed by gas engineers in New York that the placing of their mains in subways of any kind

would imperil life and property, is largely simulated. The gas engineer who cannot conduct gas in a main through a tunnel without a measurable leakage loss, or one which involves any danger even to workmen in such tunnel, should go abroad and study foreign practice. It is an interesting fact as bearing on this phase of the discussion that a considerable proportion of the gas supply of the Borough of Manhattan is now brought to it from the Borough of Brooklyn through mains laid in a tunnel under the East River. If there have been any accidents or casualties in this tunnel, or any considerable leakage of gas from the mains it carries, the facts have been carefully concealed from public knowledge. Indeed, I am told that provision for the artificial ventilation of this tunnel by means of a pipe carrying compressed air, and supplied with cocks at convenient intervals from which it might be allowed to escape and blow out inconvenient gas accumulations, has been found wholly unnecessary.

The leakage of water in distribution is an economic evil of large proportions, but it is far less serious from every point of view than the leakage of gas in distribution. It accounts for many fires and explosions. Sewers, electrical conduits and manholes, excavations in the streets (as at Broadway and Canal street), vaults, cellars and even business buildings and dwellings are rent and shattered by gas explosions with such frequency that a prudent man will in every case walk around a manhole cover rather than step on it. New York has had nine such explosions in one day, and through the winter season they are so frequent as almost to escape notice. Sidewalks have been blown up, many dwellings wrecked, with loss of life and whole blocks closed to traffic by sewer eruptions. Many of our most disastrous fires are of gas origin. The only attitude of safety for the gas company is one of cordial and even eager co-operation in demonstrating that the pipe gallery is a practical remedy for what have become intolerable conditions.

A CITY'S GOOD FINANCIAL SHOWING

THE city of San Antonio, Texas, will probably be entirely free from floating indebtedness within a year, as promised by the present administration.

The records of the city auditor's office tell the story of the strides the city is making in putting itself on a solid cash foundation. The floating indebtedness on June 1, 1903, amounted to a grand total of \$396,971.51, while for the corresponding period in 1904 the floating indebtedness had melted to only \$141,000, showing that the sum of \$255,971.51 had been placed to the credit of the city. Notwithstanding the reduction in the debt, the city has been paying cash for its supplies.

The tax collections for the new rolls of 1903, which are now delinquent, were 84 per cent. of the total rolls, revealing the fact that they were the greatest collection for any one year in the history of San Antonio. The total collection for the year ending May 31, 1904, amounted to about \$1,030,000, of which sum the tax collector's office brought in \$997,033.35, the balance by the various department's sundry receipts. The collection for this year is virtually the collection for the two years—1902-1903. Unlike former

years, when the city had only five different funds, the present income must be divided into eight separate funds, viz., the Carnegie library; Improvement District No. 2; the \$50,000 school bonds; 1902-1903 general fund; the sinking and cemetery funds. The Carnegie library and district school funds combined amounted to \$13,200 from the 1903 rolls. The records also show that the city has paid up on the back tax indebtedness about \$75,000, leaving approximately \$97,000 still outstanding. For the last thirteen years the total assessed valuation has been about the same amount, about \$30,000,000. In the meantime the city has spent hundreds of thousands of dollars for permanent street improvements, sewerage, etc., and the population has increased nearly one-half. In 1891 the assessed valuation of the city was \$30,755,485, with a tax rate of \$1.56 $\frac{1}{2}$. In 1903 the total rolls were \$33,386,705, with a tax rate of \$1.75, showing that the assessed valuation for the thirteen years have remained the same. With the proper assessment to be inaugurated by the present administration, the tax rate could be lowered to \$1.50 per hundred dollars valuation and the city get the same revenue.

SPECIFICATIONS FOR BRICK PAVEMENT

Akron, O., Tells How Its Brick Pavements Shall Be Laid—The Principal Points in the New Specifications

THE new brick pavement specifications lately published by the city of Akron, O., will be of general interest to city engineers and others interested in this form of street improvement, even though there may be no radical differences about the fundamental points. The city has more miles of brick pavement than of all other kinds combined. Out of a total of 129 miles of streets about twenty miles are paved with brick, three with asphalt and three miles are improved with macadam. It is in the heart of the Ohio paving brick belt which is a good reason why brick pavement is in the lead. It has too many miles of unpaved streets for its own good. It would be an economical investment for the city to buy a road roller, stone crusher and stone spreader and improve some of its residence streets. The principal points in the new specifications follow:

EXCAVATION

Whatever earth, loam, sand, clay, shale clay, rock paving, macadam, iron pipe, iron work, sewer pipe, brick, or any other material is to be excavated, moved or filled in, embankment to whatever extent within the limits of any proposed improvement, such earth, loam, etc., and any other material shall be known and classified as earth, and such classification shall extend to the word excavation, whenever it may appear in these specifications, or in any proposal, contract, bond or writing, pertaining to the improvement which these specifications govern.

Whenever the fill is greater than the cut, the contractor is to supply the deficiency at his price bid for excavation, no overhauling to be allowed.

Whenever the fill is greater than the cut, the amount of excavation is to be determined by the amount of fill, plus ten per cent., to be allowed for shrinkage, and when the cut is greatest the amount of cut will determine the amount of excavation.

When excavation is to be made on any street or alley, it is to extend to any approach, lawns, or abutting property, if so ordered.

Excavation is to be bid and paid for by the cubic yard, and includes the removing of trees, grubbing, trimming

lawns and cleaning up, and the price bid for excavation includes a haul of such excavation a distance of 1,000 feet in any direction, and in case the haul directed should be more than 1,000 feet, the contractor is to receive one-half cent per cubic yard for each 100 feet haul over 1,000 feet, unless otherwise provided for.

Excavation will not be considered to have been made to the proper grade, sub-grade, alignment and cross-section, unless the foundation has been thoroughly rolled, flushed or both rolled and flushed and the surface remaining shall be true, uniform and free from all soft or spongy spots, and all trenches as firm and unyielding as that part of the foundation which has not been disturbed by trenches or holes.

In making excavations, and after the foundation has been thoroughly rolled or flushed, or both, as the case may be, if spongy or soft spots are encountered, or if it is found that any trenches have not been properly filled or prepared, the

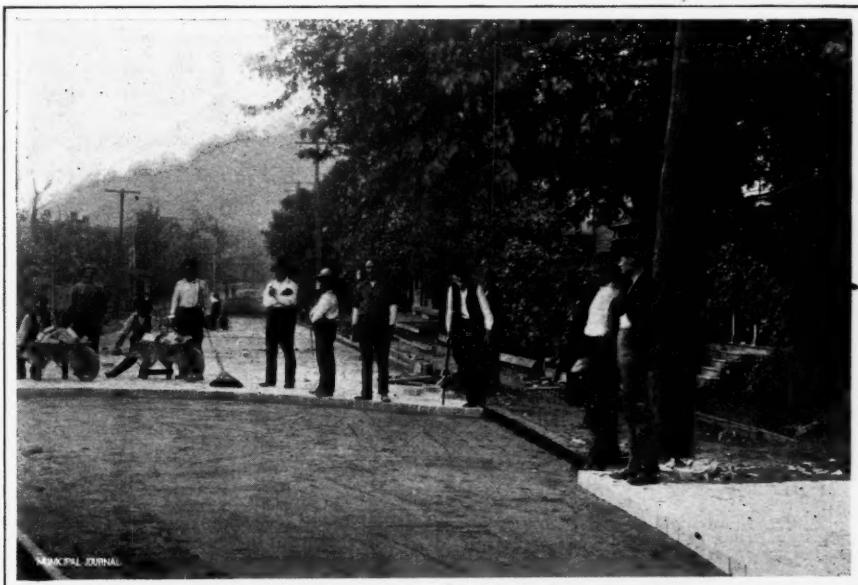
contractor shall report the same; and all bad spots or trenches, as the Board of Public Service may direct, shall be taken out and filled in layers to such extent with sand and gravel, and rammed and rolled to such an extent by the contractor as the Board of Public Service directs; the exact amount of such work shall be measured, and the contractor to receive therefore forty cents for each cubic yard.

In making any fill in embankment the material composing such fill shall be put on in layers and properly spread as directed. The fill during progress of making shall be flushed and rolled, if consistent, and every means appropriate shall be used to settle and make the entire fill firm and unyielding; all such preparation, flushing, rolling, etc., to be done by the contractor at his own expense, the Board of Public Service to determine when such preparation, flushing and rolling has been properly done.

All earth excavated and not used for filling on the street shall belong to the city of Akron, and the contractor shall dump and spread the same where directed by the Board of Public Service.

OLD PAVING MATERIAL

Old paving taken up by the contractor and not relaid or



BRICK PAVEMENT RECENTLY LAID ON ONE OF THE PRINCIPAL STREETS OF CANONSBURG, PA., WITH BRICK MADE BY THE PITTSBURG-BUFFALO COMPANY, PITTSBURG, PA.

purchased by him will be measured and paid for per cubic yard, the same as excavation. Price to include the removal of all kinds of material.

The price bid for excavation or embankment shall include the excavation and removal of all earth of every kind necessary, and all rock, cinder, shale, boulders, and the removal of all stumps, box drains or gutters, railroad ties, all sheet piling left in trenches and other obstructions; also, breaking down and filling abandoned basins, the grubbing out and removal of all underbrush, and all trees six inches or less in diameter, one foot above the surface of the ground.

TREES

All trees more than six inches, and not exceeding twelve inches in diameter, one foot above the surface of the ground, shall be classed as small trees, and all more than twelve inches in diameter, one foot above the surface of the ground, shall be classed as large trees. All such trees ordered removed, larger than the six inches specified, shall be at a specific price for each tree. All portions of every tree, stump or underbrush removed as ordered shall be taken from the street, and not deposited upon any other street or public ground, nor upon any private lot, without the consent of the owner or agent of such lot.

SUB-BASE

Excavation is to be made to a depth and in a manner so that the surface remaining (to be known as sub-base) when thoroughly rolled, will be of the proper depth, grade and cross-section to be designated by plan or specification. Sufficient ballast must be used so that when it is thoroughly flushed, rammed and rolled the upper surface will be on proper grade, and no allowance will be made for any part of the ballast or foundation material that is rolled into the sub-base. The contractor must take this into consideration in making his bid.

All foundations, sub-base and ballast will be rolled by the city with a steam roller whenever the material to be rolled can be readily and properly rolled with a steam roller, and when roller is not being used on other improvements or is in proper condition for use. When city does such rolling the contractor is to furnish all the necessary means and men to get roller out of holes, and to fill up any depressions or clear away any obstructions that may be required in order that when properly rolled the surface remaining will be as intended. Any damage done to any curbing, paving or sewer is at the contractor's risk and he is to repair such damage at his own expense. All other tamping, roiling and ramming shall be done by the contractor at his own expense and included in the price bid for any improvement.

BALLASTING

Upon the sub-grade when properly prepared, shall be placed a bed of ballasting of furnace slag to a depth of eight inches after rolling, or concrete to a depth of six inches; in both cases the upper surface of the ballast must be parallel to and six inches below the finished surface of the street.

SLAG BALLAST

Slag ballast is to be composed of furnace slag and sand or gravel to be selected and prepared as herein designated.

Slag must be free from dirt, ashes or refuse matter, and must not have been used in the manufacture of asbestos or mineral wool.

Whenever the slag is not taken from the furnace direct to the car, but from piles, and has been subjected to the action of the weather thereby slackening, leaving lime deposits throughout the mass, such dust of limestone must be separated from the slag and not hauled on to the proposed improvement.

Slag must be broken into uniform sizes throughout the entire improvement. The largest pieces shall be not more than four inches in their greatest dimension.

Upon the completed sub-base (which must be the specified distance below the surface of the finished improvement) slag is to be placed, broken and raked to a uniform and true crown, the entire mass presenting a symmetrical appearance as to size, formation and density. The contractor is to use his judgment as to the height the surface of the slag is to be left above the required finished surface of the slag ballast to allow for the compression made by the steam roller, and if the operation of rolling makes the surface of the slag wavy or in holes or fails to compress the slag to the required elevation, the contractor is to fill all low places and pick off all high places, and so repeat this operation until when the slag has been finally rolled the surface remaining will be of the exact elevation and cross-section required.

After the slag has been rolled and accepted, coarse sand or fine gravel will be spread over the slag (and in no case will sand or gravel be allowed to be dumped in piles on the slag) to a depth of one-half inch, and then thoroughly flushed into the slag by the contractor. After the flushing has been thoroughly done, the city will roll the same and any inequalities detected by the use of the roller must be remedied by the contractor so that when the slag ballast is finished it will be of the required crown, grade and elevation.

The contractor is to protect the curb so that when the slag ballast is being rolled it cannot be displaced and any damage done by the roller to the curb must be repaired by the contractor at his own expense.

Slag ballast will be paid for by the cubic yard as measured in the improvement, and no allowance will be made for ballast that may be rolled into the sub-base or for ballast that may be put in to bring sub-base to the proper elevation.

CONCRETE BALLAST

Concrete ballast shall be composed of Portland cement one part, sand three parts and broken limestone eight parts, all by measure by means of suitable cubical boxes. Shovel measurements will not be permitted. The specified proportions of cement and sand will be thoroughly mixed dry upon a tight platform and by the addition of water made into mortar as hereinafter specified for making mortar. The required volume of broken stone will be spread upon the mortar and the mass turned at least four times and until each fragment of stone or gravel is completely crated with mortar. The concrete as thus prepared will be immediately rammed in place in the work, and no concrete, in which the mortar has begun to set, will be permitted to be used.

Machine mixing will be allowed, provided, in the opinion of the Board of Public Service, the product is of as good a quality as that specified for hand-mixed concrete.

Concrete will be paid for at the price bid for same complete in place.

CEMENT

The cement used shall be equal to the best grade of American Portland cement, and shall conform to such chemical requirements as the Board of Public Service may deem necessary in order that the best grades of Portland cement may be obtained.

It shall require at least thirty minutes to develop initial set, and hard set shall not be taken in less than three hours, the test being determined by Gilmore's wires.

Briquettes of neat Portland cement, with one square inch breaking section, shall develop at least the following strengths:

Neat briquettes.	Age.	Strength.
24 hours (in water after hard set).....	125 pounds	
7 days (one day in air, 6 days in water).....	400 "	
28 days (one day in air, 27 days in water).....	550 "	

Sand briquettes with one square inch breaking section, composed of cement one part, and standard crushed quartz sand (passing No. 20 sieve) three parts, by weight shall develop at least the following breaking strengths:

Age.	Strength.
7 days (1 day in air, 6 days in water).....	125 pounds
28 days (1 day in air, 27 days in water)	200 "

SAND

All sand, whether used for concrete or brick masonry, shall be coarse, sharp, silicious sand, free from clay, or other impurities. It shall be stored upon the work in a manner satisfactory to the Board of Public Service. Should the sand proposed for use in concrete contain pebbles, the Board of Public Service may permit them to be used in the concrete in lieu of an equal volume of broken stone. Said use of pebbles in concrete will be subject to such restrictions and limitations as the Board of Public Service may impose.

CONCRETE STONE

All stone for concrete shall be hard limestone, sandstone, trap, quartzite or granite, acceptable to the Board of Public Service.

MATERIAL DELIVERED

Material delivered on the sides of the street, for use upon the street, shall be neatly and compactly corded up along the sides of the roadway in such manner as to cause the least inconvenience to property owners and to the general public, and in such shape that the engineer can make a reasonably close and satisfactory measurement of the same. Private drives and street crossings to be kept open. Shade trees and other improvements shall be protected by the contractor from all damage by stone or otherwise. Fire hydrants are not to be obstructed at any time.

PAVING BRICK

Paving brick shall consist of the best quality of sound, hard-burned repressed paving brick, made and burned especially for street paving purposes, and shall stand all reasonable tests as to durability and fitness required by the Board of Public Service, and to which paving material is equally subjected; the material to be burned in down draught kilns or furnaces. All brick to be square and straight, free from cracks and other defects and of uniform size and texture, not less than four (4) inches in depth, and not less than

three (3) by eight and one-half (8½) inches in other dimensions, and of a quality to be approved by the Board of Public Service, and in their judgment must be equal to the best samples of paving brick in the market.

INSPECTION OF BRICK

All brick to be subject to thorough inspection by the Board of Public Service and their agents, both before and after laying, and all rejected material to be removed from the street and the deficiency made good by the contractor, and he shall at all times provide, at his own expense, a sufficient number of men to assist the inspectors in the proper inspection and culling of the bricks.

All soft, over-burned, cracked, heavy kiln marked, or defective brick found in the pavement at any time before its final acceptance, shall be removed by the contractor and the place made good at his own expense.

MANNER OF LAYING

After the ballast has been laid as hereinbefore specified and prepared by furnishing, laying and spreading sand thereon, perfectly free from all pebbles or stones, and raked and struck with a template, leaving the surface of the same two inches from the ballast, perfectly smooth and of the exact alignment, grade and crown to be given by the finished improvement, brick shall be laid on edge, end to end, in straight courses, at right angles to the curb except at intersections where the courses are to be placed at such angles as the Board of Service may designate. The brick shall break joints at least three (3) inches with brick in adjoining courses, to be set perpendicular to the grade of the street and to a height of one-half to one inch, or to such a height as the Board of Public Service may direct above the true grade and crown of the street when finished to provide for settlement in pounding and rolling. After the bricks are laid the end joints are to be made close and compact by use of a bar applied at the ends next the curb. Every fourth course, or as the Board of Public Service may direct, the bricks are to be closed up and the courses straightened by use of a sledge hammer and wood bar placed against the brick. Nothing but whole brick shall be used, except in starting a course or in making a closure, where not less than one-third brick may be used in breaking joints, which shall be made tight and close at ends throughout the rows. Great care shall be taken in breaking and trimming the bricks for this purpose so as not to check or fracture the part to be used. All joints to be cut or broken at right angles to top and sides of the bricks. The breaking and trimming must be done by experienced men, working with proper tools for this purpose. The price bid for brick in place shall include the two-inch sand cushion as above specified, and also the laying of cross walk stringers, or stone for the purpose of backing up paving at all intersections or drives, or ends of pavement.

RAMMING AND ROLLING

The paving, when laid as specified, to be thoroughly rammed in courses, two separate times, as may be directed, besides the final or surface ramming, using a square rammer, weighing not less than eighty pounds, no iron of any kind being allowed on its lower face to come in contact with the paving. In the third or final ramming, the pavement to be surfaced by using a long straight edge, and by

a thorough rolling of the pavement with a roller weighing not less than six tons as directed, and when complete to conform to the true grade and crown of the roadway, as directed by the Board of Public Service.

TAR FILLING

The joints between the brick, to the full depth of same, shall be filled with a composition known as the No. 6 grade of coal tar. The composition shall be heated to a temperature not less than 300° Fahrenheit. Extra material and care shall be used at the gutters in filling all joints in both paving and curbing and around catch-basins, or other receptacles, to effectually prevent the leakage of water into the sub-roadway. All joints to be completely filled to the top, and refilled such number of times thereafter as may be directed before adding top dressing. The tar filling not to be used until the bricks are completely dry.

If the improvement be to grade, curb and gutter and macadamize the roadway with slag, slag will be used as shown in the plan for the improvement, with brick gutters. The joints between the brick will be filled with a grout filling composed of Portland cement one part, and clean sand one part, measured in boxes, and sufficient water added to make a thin, easily flowing grout. The grout shall be prepared in small quantities and shall be stirred rapidly and constantly in the box while being applied to the pavement, and shall then be rapidly swept into the joints of the pavement with proper brooms. No settling or residue will be allowed to be used.

HOW APPLIED

Unless otherwise directed, the filling is to be done by two or more applications of the grout. The first two-thirds in depth from the bottom of the spaces to be filled with the grout somewhat thinner than required for the remaining one-third. The remainder of the spaces are then to be filled with the thicker grout, and, if necessary, refilled until the

joints will remain full to the top. The brick to be wet as directed, before the grout is applied. All traffic must be kept off the pavement for at least seven days.

The surface of the paving, when completed as above, shall be covered with a light top dressing of clean, coarse sand of approved quality.

PAVING BRICK

Parties sending or submitting brick to be placed on file as samples of brick to be furnished, if selected to be used, must carry out the following instructions:

Four brick of each kind and make must be filed, and on the face of each brick must be plainly stated "the kind of brick"; the name of, where and by whom made, and by whom and for what purpose submitted. The contractor must state definitely in his bid the particular kind and make of brick he proposes to use.

Failure to do this will be considered as an informality and the bid will be thrown out. Samples of the brick bid on must be filed in the Department of Public Service at least three days before proposals are received.

TESTING BRICK

The city reserves the right at its option, after the bids are received and before the awarding of the contract to any bidder, to make such tests of ten of the sample bricks, deposited by the bidders in the Department of Public Service, as the Board of Public Service may deem necessary to determine the durability and fitness of the material proposed to be furnished by such bidder as shown by his samples, and reserves the right to hold the bids, not exceeding thirty days, for such purpose, and any brick not fulfilling the requirements of the specifications, or that may be deemed unfit for paving purposes, as shown by such tests, will be rejected, and the bid made upon any such rejected samples shall be considered informal and not in conformity with the specifications.

CIVIL SERVICE IN SAN FRANCISCO

CIVIL Service went into effect in San Francisco, January 8, 1900. Laborers to the number of 2,782 have been registered, no examination being required for common or unskilled labor. Eighty-eight examinations have been held and out of 5,301 applicants, 3,199 have been passed. From the eligible lists "over 1,000" (to quote the chief examiner) appointments have been made, including temporary positions. The firemen and policemen came in under the new charter with the civil service, to which they were not subject except for promotion, and with them there are now more than 1,700 positions in the city government, carrying annual salaries aggregating in round numbers \$1,900,000, under civil service. There are more than 400 positions subject to civil service, filled by temporary employees, but many of these are minor positions carrying small pay, such as ward tenders and bedmakers in the hospitals and almshouse.

The courts have decided that the county offices (San Francisco being a combined city and county) are not under civil service. In all the departments outside civil service there are 1,879 places carrying annual salaries aggregating about \$1,700,000. Under civil service there are 2,100 places with

salaries aggregating \$2,200,000. It is apparent, therefore, that more than one-half of the city's salary roll is controlled by the civil service provisions of the charter, and that so much of it has been taken away from the spoils system.

Civil service has measurably increased the quality and quantity of work done by city employees. It is claimed that there has been a large saving to the city through the adoption of the merit system. In the Department of Elections, former Registrar Thomas Walsh says that, "before the adoption of the charter the expenses in the years when elections were held amounted to about \$200,000, whereas now the cost is about \$113,000, although we have had from two to four elections a year."

There has been some criticism because the Civil Service Commission has not proceeded more rapidly with its work. It replied that it had suffered because of a lack of funds, and the Board of Supervisors has promised whatever money is needful to enable it to carry on its work. There are three commissioners, one chief examiner or secretary, a clerk and a stenographer, who at present comprise the official staff of the bureau.

DEBT AND CREDIT OF ST. LOUIS

Municipal, Banking and Commercial Conditions Reviewed—The Situation Described from the Standpoint of a Civic Patriot by City Comptroller Player

By James Y. Player



JAMES Y. PLAYER,
Comptroller, St. Louis

St. Louis became a city December 9, 1822. In the year 1877 the county of St. Louis and the city proper were merged, the city assuming the indebtedness of the county. The city covers 39,277 acres, and in point of population is the fourth largest city of the United States.

The population in 1822 was 5,000; in 1833, 6,397; ten years later, 34,140; in 1856, 125,200; 1866, 204,324. The census of 1900 enumerated the population as 575,238. Estimated figures for 1901, 1902 and 1903, 600,000, 621,000 and 700,000, respectively.

Assessable valuations of the municipality (real estate and personal) figure \$443,865,560. The assessments for railroads, bridges, telegraph, express and street railway property are fixed at \$28,041,040, while the collections through city assessments amount to \$415,824,520.

Ten years ago the assessment placed upon real and personal valuation was \$287,826,420, an increase of \$156,039,140. A detailed comparison of valuation figures follow:

Year.	Real estate.	Real & personal.
1893	\$242,737,430	\$287,826,420
1894	270,288,800	315,292,560
1895	286,098,900	330,486,640
1896	296,419,690	345,940,150
1897	299,635,220	344,749,700
1898	314,975,540	360,516,660
1899	330,019,930	374,588,490
1900	337,201,940	380,779,280
1901	342,252,540	394,722,700
1902	357,701,410	418,046,300
1903	365,633,250	443,865,560

Tax rate for 1903-1904 has been arranged at \$1.48 per \$100. This rate provides .20 for the payment of debt and interest; .09 for investment and sinking fund of World's Fair bonds; \$1.15 for general municipal purposes, and .04 for the public library.

Balances held in the treasury at the close of business April 11, 1904, were \$3,180,080.70. These balances are derived from the various revenue funds as follows:

Interest and public debt	\$406,977.66
Municipal	674,174.76
Water works	2,020,332.43
Harbor fund	78,595.85

Receipts for the fiscal year, including cash in treasury, amounted to \$14,306,439.49. The expenditures and appropriations aggregated \$11,126,358.79. A statement follows, showing in detail revenues to which the income and expenses are accounted for;

Funds.	Receipts.	Expended.
Interest and debt	\$1,947,628.56	\$1,540,650.90
Municipal	8,577,106.10	7,902,931.34
Water works	3,646,137.69	1,625,805.26
Harbor fund	135,567.14	56,971.29
	<hr/>	<hr/>
	\$14,306,439.49	\$11,126,358.79

Appropriations for 1903-1904 for municipal purposes were \$7,902,931.34. For 1904-1905 the amount has been fixed at \$8,371,791.36. The appropriation for all purposes last year was \$11,126,358.78; while for 1904-1905 the total sums up \$11,258,883.58.

The city owns its water works, the revenue from which averages \$1,900,000 per annum, the net operating expense and cost of collecting water rates being about \$682,000 per year. In addition the municipality operates, maintains and is the possessor of schools, engine houses, city hall, court house and jails, markets, police stations, etc. A conservative estimate of the city's assets is \$55,000,000.

A comparative statement showing the progress made by the city from 1880 to 1904 follows:

	1880.	1904.
Miles improved streets	307.74	467.79
Miles of sewers	195.95	549.05
Bonded debt	\$22,507,000	*\$23,539,278.30
Sinking fund		1,497,557.29
Assessed valuation	160,750,440	428,510,340.00
Rate taxation per \$1,000 municipal, including interest and library	17.50	14.80
Rate taxation per \$1,000, city, State, school	26.00	22.00

RECEIPTS

Interest and public debt revenue	\$1,598,294.82	\$1,947,628.56
Municipal revenue	2,792,392.53	8,577,106.10
Water works revenue	647,534.71	3,646,137.69
Harbor fund	75,009.73	135,567.14

Total receipts \$5,113,231.79

\$14,306,439.49

DISBURSEMENTS

Interest and public debt revenue	\$1,466,195.23	\$1,540,650.90
Municipal revenue	2,645,309.07	7,902,931.34
Water works revenue	631,099.81	1,625,805.26
Harbor fund	63,161.10	56,971.29

Total disbursements \$4,805,765.21

\$11,126,358.79

* Includes the indebtedness of the former county of St. Louis, amounting to \$6,111,000 and \$5,808,000 bonds floated for water purposes.

BALANCES	
In debt revenue fd....	\$132,099.59
In municipal fd.....	147,083.46
In water works fd....	16,434.90
In harbor fund	11,848.63
Total balances	\$307,466.58
Bal. in Treas., including all special funds and accounts	549,466.58
Bank clearings	711,459,489.00
	\$3,180,080.70
2,276,416,237.00	

St. Louis has no floating debt. At the close of the fiscal year the treasury held, after charging against it all liabilities, with the exception of the bonded debt, unappropriated surpluses in all the revenue funds.

The bonded indebtedness of the municipality matures in the following order:

1905	\$2,850,000.00	1913	\$1,250,690.50
1906	245,000.00	1914	2,000,000.00
1907	2,844,100.00	1915	975,000.00
1908	1,559,000.00	1918	2,578,000.00
1909	675,000.00	1919	275,000.00
1911	2,497,487.80	1920	12,000.00
1912	1,155,000.00	1922	4,623,000.00

St. Louis is the largest and most important city in the Louisiana Purchase; is the largest manufacturer of tobacco in the world; is one of the great railroad centers, twenty-eight lines entering the municipality. The city has twenty-three public parks covering an area of 2,183 acres; maintains ninety-two public schools having an average attendance of 86,484 per annum. The data following fully illustrates the importance of St. Louis from a commercial point of view:

1903

Grain receipts, 68,894,986 bushels.
Flour receipts, 2,340,695 barrels.
Flour manufactured, 1,112,316 barrels.
Flour shipped, 3,127,096 barrels.
Banking capital and surplus, \$87,009,412.
Tonnage received and forwarded, 34,104,193 tons.
Post office receipts, \$3,111,490.
Real estate transfers, \$51,165,625.
Value of buildings erected, \$14,544,430.

T. A. Stoddart, manager of the St. Louis Clearing House, in speaking of banking conditions says:

"St. Louis ranks fifth in amount of clearings. Dividends paid in 1903, \$2,136,000; dividends paid by trust companies, \$2,060,000; amount carried to surplus, \$2,068,833; shows a total of \$6,264,833 as the net earnings for the year. In the combined statements of the banks and trust companies the

increase in active items between 1902 and 1903 were as follows:

Loans increase	\$7,217,860
Increase bonds and stocks	3,512,487
Cash and exchange increase	5,744,564
Increase in deposits	17,414,833"

The Clearing House Association was formed in the year 1869. In 1870 the total clearings amounted to \$387,407,729; ten years later the total was \$711,459,489. In 1890 the sum reported was \$1,118,573,210.

The official report of the Clearing House shows that during the last ten years the institutions of St. Louis have made steady progress. The summary follows:

1893	\$1,139,014,291
1894	1,127,702,906
1895	1,244,323,654
1896	1,158,602,359
1897	1,366,703,956
1898	1,455,462,062
1899	1,638,384,203
1900	1,688,849,494
1901	2,270,680,216
1902	2,506,804,320
1903	2,510,479,245

City Comptroller James Y. Player, in speaking of the municipality and its interests, says:

"We welcome strangers within our gates because we are proud of our city and in knowing that no visitor has been disappointed in his expectations when visiting St. Louis. We are proud of our fame as a manufacturing center, proud of our mammoth industries whose wares are known to all markets of the world. The many evidences of thrift and the progress of our civic improvements and miles of beautifully paved streets lined with commodious and attractive homes, appeal to all, so that in time to come St. Louis will be heralded throughout the United States as a model of advancement. And we can especially feel proud of our citizens, of the energetic manhood which so greatly aided in the development of the municipality, from the time of its incorporation up to the present period. Destroy the city and it would rise again, for its wealth is not in gold or things material, but in the intelligent, progressive, law-abiding spirit of the citizen."

Ordinances are being prepared for the reissue on April 1, 1905, of \$1,000,000 park bonds. At the same time \$900,000 of these bonds will be redeemed. These bonds were issued in 1875, and bear 6 per cent. interest. The reissue will bear but 3½ per cent. On June 1, 1905, there will fall due \$950,000 of the St. Louis Gas Company judgment bonds, which bear 4 per cent. interest.

PORTLAND CEMENT*

Its Uses in Engineering Construction - Constitution of Cement from Chemical and Physical Points of View, Concluded

By E. Kuichling, C. E.†

IN the preceding five numbers of THE MUNICIPAL JOURNAL AND ENGINEER, abstracts of some of the most important researches concerning the constitution of Portland cement have been presented, and in the present number this subject will be concluded by an account of the views of another distinguished American investigator, Mr. Clifford Richardson, of Long Island City, N. Y.

RICHARDSON'S STUDIES OF CEMENT

For nearly twenty years past a scientific study of various brands of Portland cement for use in the public works of Washington, D. C., has been made by Mr. Clifford Richardson, of Long Island City, N. Y. The wide experience thus gained, combined with an intimate knowledge of the physical and chemical researches of other investigators at home and abroad, places him in the foremost rank of authorities on cement, and hence the views which he holds as to the constitution of Portland cement are of particular interest. Through his courtesy it is possible to present here an abstract of his most recent conclusions, which will appear in detail and with all the experimental evidence in the next numbers of *Cement*.

In view of the apparent impossibility of solving the problem by purely chemical investigations, Richardson turned his attention to a study of the physical properties, and made an elaborate microscopical examination of many thin sections, not only of industrial clinker, but also of clinkers prepared in the laboratory from pure chemicals in definite molecular proportions. Furthermore, he prepared and examined the various basic calcic silicates and aluminates which might possibly occur in clinker, identified them by their form and optical properties as definite chemical compounds, and established the fact that the so-called silico-aluminates of Meyer and others do not exist as definite compounds. A short notice of his work appeared in *Thon-industrie Zeitung*, 1903, page 941, but the conclusions there stated were modified very essentially by his subsequent investigations.

He first devoted himself to a study of the mineralogical constitution of industrial Portland cement clinker, with a view of determining whether the constituents described by Le Chatelier and Törnebohm could be identified in American clinker. He found that such clinker consisted essentially of two constituents, the alit and celit of Törnebohm, although two others were detected in some cases, one the belit of Törnebohm and the other a rod-like substance which he failed to identify as felit. The isotropic mass was not identified with certainty in any case.

The alit was a substance of low optical activity, giving bluish-gray interference colors in polarized light with crossed Nicol's prisms, and affording considerable evidence

of crystalline structure. The celit was a substance of high optical activity and gave brilliant interference colors with polarized light. It is yellow in color while the alit is colorless. It apparently contains the residual material not entering into the formation of alit. Belit consists of globules such as are found in emulsions. It has a very high index of refraction and the optical characteristics of celit. No evidence of either di-calcic silicate or of any aluminate was detected.

For the purpose of identifying individual silicates and aluminates, Richardson prepared the following substances and found them to be in all probability definite chemical compounds:—

Mono-calcic silicate (SiO_2 , CaO). A crystalline substance of high optical activity and having little or no hydraulic properties. Specific gravity 2.9.

Di-calcic silicate (SiO_2 , 2CaO), or more probably (2SiO_2 , 4CaO). A very definite crystalline compound of high optical activity, and of every little hydraulic activity except in the presence of carbonic acid, but setting slowly in water and generally lacking soundness or constancy of volume. Specific gravity 3.29.

Tri-calcic silicate (SiO_2 , 3CaO) or more probably (2SiO_2 , 6CaO). A definite crystalline silicate of low optical activity and corresponding in this respect with alit. Its hydraulic activity is not great, but greater than that of di-calcic silicate. If fused and re-ground it sets slowly like Portland cement. Specific gravity 3.03.

Three definite silicates of calcium, therefore, exist, the two more basic ones being strongly differentiated from each other by their optical activity.

Mono-calcic aluminate (Al_2O_3 , CaO). This aluminate is a crystalline substance of high optical activity, but it is not sufficiently basic to be found in a material of such basic character as Portland cement clinker. Specific gravity 2.90.

Tri-calcic di-aluminate ($2\text{Al}_2\text{O}_3$, 3CaO). This aluminate is of highly crystalline character and of great optical activity, making it readily recognizable. Specific gravity 2.92.

Di-calcic aluminate (Al_2O_3 , 2CaO). A substance crystallizing from a state of fusion in dendritic forms having no optical activity and being therefore isotropic. This property differentiates di-calcic aluminate very sharply from the preceding one and makes the identification of the two substances very easy. Specific gravity 2.79.

Tri-calcic aluminate (Al_2O_3 , 3CaO). This aluminate crystallizes from the fused condition in elongated octahedra. It is isotropic, and might at first be considered as not being a definite compound, but merely as the di-calcic aluminate crystallizing out of a magma of indefinite composition. It has been shown, however, by other investigations too lengthy for citation here that it is undoubtedly a definite aluminate. Specific gravity 2.91.

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† Engineering Editor, MUNICIPAL JOURNAL AND ENGINEER.

Richardson's next step was the preparation of Portland cement clinkers of the same basicity as industrial ones, but in which alumina was substituted for the iron oxide and lime for the other bases present. Thin sections of these clinkers showed that they consisted solely of alit and celit. The amount of celit varies inversely with the basicity of the clinker, being larger the smaller the amount of lime present. This leads to the inference that alit and celit are two solid solutions of different composition. In order to determine what solid solutions would develop from fused mixtures of tri-calcic silicate and the various aluminates, a series of four mixtures were prepared in the following proportions:—

Molecular Composition.	Number of Molecules	Per cent. by Weight.
Each with 12SiO_2 to $2\text{Al}_2\text{O}_3$.	CaO.	SiO_2 . Al_2O_3 . CaO.
$12(\text{SiO}_2, 3\text{CaO}) + 2(\text{Al}_2\text{O}_3, \text{CaO}) \dots$	38	23.7 6.7 69.6
" " + $2\text{Al}_2\text{O}_3, 3\text{CaO} \dots$	39	23.2 6.6 70.2
" " + $2(\text{Al}_2\text{O}_3, 2\text{CaO}) \dots$	40	22.8 6.4 70.8
" " + $2(\text{Al}_2\text{O}_3, 3\text{CaO}) \dots$	42	22.1 6.2 71.7

In thin section it was found that the clinker composed of 6 molecular parts of tri-calcic silicate and one of mono-calcic aluminate had a structure similar to that of the clinkers previously described, but that the amount of high optically active material corresponding to celit was large. With the aluminate of next higher basicity the amount of celit was smaller, and it decreased still more with the di-calcic aluminate. In the clinker where tri-calcic aluminate was assumed to be present, all the celit had disappeared, and the section was a uniform and homogeneous mass of alit. This led at once to the conclusion that alit is a solid solution of tri-calcic aluminate in tri-calcic silicate, and that the presence of celit in the other clinkers was due to the fact that the amount of lime present was insufficient to permit of the existence of alit without the formation, at some time during the burning, of some di-calcic silicate and di-calcic aluminate. When these di-basic compounds are formed, they dissolve in each other and thus produce a solid solution which has great optical activity, owing to the presence of the high optically active di-calcic silicate. On these grounds the above clinkers would therefore consist of alit and celit in the following proportions:

ALIT.	CELIT.	Per cent by Weight of
Molecular Composition.	Molecular Composition.	Alit. Celit.
$9(\text{SiO}_2, 3\text{CaO}) + (\text{Al}_2\text{O}_3, 3\text{CaO})$	$3(\text{SiO}_2, 2\text{CaO}) + (\text{Al}_2\text{O}_3, 2\text{CaO})$	76.1 23.92
10 "	2 "	82.8 17.0
11 "	1 "	88.0 12.0
12 " + $2(\text{Al}_2\text{O}_3, 3\text{CaO}) \dots$	100.0 0.0	

These experiments explain thoroughly the constitution of pure Portland cement clinker. It consists largely of alit, which is a solid solution of tri-calcic aluminate in tri-calcic silicate, and some celit, which is a solid solution of di-calcic aluminate in di-calcic silicate; and the amount of celit is proportional to the lack of lime necessary to produce only alit. The presence of iron, magnesia and the alkalies will produce results which do not affect these conclusions materially.

Richardson then devoted himself to the study of a series of solutions of tri-calcic aluminate in tri-calcic silicate in which the proportion of the first-named substance varied from 0 to 100 per cent. Thin sections of these clinkers

or solid solutions showed that alit was formed up to the point where all the aluminate present was soluble in the silicate in the solid state, in the same way that a certain amount of ether is soluble in water. When the aluminate exceeded this amount an entirely different structure, not corresponding to that of Portland cement, was discovered. In certain proportions an emulsion, similar to that which would be formed if water and ether was shaken together, was observed, the entire mass consisting of solid globules. At the other end of the series, crystals of aluminate were present which contained the silicate in solution. This principle of solid solution explains the constitution of Portland cement very simply and clearly in the same way as has been adopted by metallographers to explain the constitution of steel and alloys of various metals.

Richardson is continuing his work on these lines, and it is evident that a very large field has thus been opened for investigation which will probably be of as much interest industrially as scientifically.

SUMMARY OF INVESTIGATIONS

In the foregoing abstracts, an attempt has been made to present briefly the results of the most important recent investigations on the constitution of Portland cement, and also to indicate some of the difficulties that attend the study of the subject. The older treatises on cements and mortars, such as those of Gen. Q. A. Gilmore, Dr. W. Michaelis, E. Candlot and others, set forth that Portland cement is essentially a mixture of tri-calcic silicate and tri-calcic aluminate, and that the ferric oxide probably combines with a comparatively small portion of the lime, alumina, magnesia and silica to form a flux which facilitates the chemical combination of the greater part of the silica and alumina with the lime. This now appears to be confirmed by some of the new researches.

We thus find at the present time a variety of theories concerning the essential constitution of unhydrated Portland cement, as follows, it being understood that the proportions of the separate compounds are not indicated in the formulas:

- Prior to 1890 a mixture of tri-calcic silicate and tri-calcic aluminate ($3\text{CaO}, \text{SiO}_2 + 3\text{CaO}, \text{Al}_2\text{O}_3$) as given by Gilmore, Michaelis, Candlot, Le Chatelier and others.
- In 1890 Feret proposed a mixture of tri-calcic silicate and mono-calcic aluminate ($3\text{CaO}, \text{SiO}_2 + \text{CaO}, \text{Al}_2\text{O}_3$).
- In 1893 La Chatelier proposed a mixture of tri-calcic silicate and a compound of lime, alumina and silica, of the composition ($3\text{CaO}, \text{SiO}_2 + 3\text{CaO}, \text{Al}_2\text{O}_3, 2\text{SiO}_2$).
- In 1897 Newberry proposed a mixture of tri-calcic silicate and di-calcic aluminate ($3\text{CaO}, \text{SiO}_2 + 2\text{CaO}, \text{Al}_2\text{O}_3$).
- In 1897 Törnebohm proposed a mixture of alit, celit, belit and felit. Of these the first named is the most important constituent, and is apparently a mixture of tri-calcic silicate and a highly basic calcic aluminate of indeterminate composition, containing also some magnesia, alkalies and iron oxide, the probable composition being (X. $3\text{CaO}, \text{SiO}_2 + 9\text{CaO}, 2\text{Al}_2\text{O}_3$). The second is next in importance, and is an indeterminate compound of lime, alumina and iron oxide, with possibly some magnesia and alkalies, of the probable composition ($3\text{CaO} [\text{Al}, \text{Fe}]_2\text{O}_3, 2\text{SiO}_2$). The third, or belit, is probably a mixture of di-calcic silicate, tri-

calcic aluminate and iron oxide ($X. 2\text{CaO}, \text{SiO}_2 + 3\text{CaO}, \text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$). The fourth, or felit, along with a vitreous substance, is of indeterminate composition, but is small in quantity like the third. In general, Törnebohm's proposition is similar to Le Chatelier's of 1893.

6. In 1898-1902 Zulkowski proposed a combination of di-calcic silicate and di-calcic aluminate, mixed with free lime ($4\text{CaO}, \text{Al}_2\text{O}_3, 2\text{SiO}_2 + \text{CaO}$).

7. In 1898-1902 Rebuffat proposed a combination of di-calcic silicate and free lime forming a crystalline compound, mixed with a calcic aluminate having less than three equivalents of lime to one of alumina ($2\text{CaO}, \text{SiO}_2 + \text{CaO} + \text{XCaO}, \text{Al}_2\text{O}_3$).

8. In 1901-1902 Meyer proposed a mixture of tri-calcic silicate and a double silicate of lime and alumina, without any free lime ($3\text{CaO}, \text{SiO}_2 + 4\text{CaO}, \text{Al}_2\text{O}_3, \text{SiO}_2$).

9. In 1903 Newberry proposed a mixture of tri-calcic silicate, di-calcic aluminate and a non-crystalline magma of indeterminate composition, but embracing lime, alumina, magnesia, ferric oxide, alkalies and silica in various combinations.

10. In 1903-1904 Richardson proposed a mixture of alit and celit, the former constituting the greater part of the mass and being a solid solution of tri-calcic aluminate in tri-calcic silicate, while the celit is a solid solution of di-calcic aluminate in di-calcic silicate.

A number of other theories of the constitution of Portland cement might also be adduced, but as the subject is still in dispute by experts, the foregoing may suffice to indicate what has been done in this direction.

CHARACTERISTICS OF THE PRINCIPAL CONSTITUENTS OF CEMENT

For convenience of reference the following summary of the characteristics of the principal constituents of anhydrous Portland cement has been prepared:

TRI-CALCIC SILICATE is a white crystalline substance of low optical activity in polarized light. When pulverized and mixed with water, it sets very slowly, without any rise of temperature or change of volume, but ultimately becomes quite hard and strong. On hydration it decomposes, according to Newberry, into di-calcic silicate or tri-calcic di-silicate and calcium hydrate; but, according to Le Chatelier and others, it passes into hydrated mono-calcic silicate, crystallizing in minute needles, and calcium hydrate crystallizing in large hexagonal plates. Pats remain sound after four or five hours' exposure to steam. The specific gravity of the anhydrous solid material is 3.05, and that of the powder is 3.02 to 3.03.

DI-CALCIC SILICATE is a white crystalline substance of high optical activity in polarized light. At ordinary temperatures it crumbles spontaneously into powder unless it is quenched in water while at white heat. According to Newberry's first experiments, when pulverized and mixed with water its sets and hardens somewhat quicker than tri-calcic silicate, without any rise of temperature or change of volume, and pats remain sound after exposure to steam; but according to his later experiments both the cooled and the quenched material possess little hydraulic activity and remain soft under water after several months. According

to Richardson it sets slower in water than tri-calcic silicate and generally lacks constancy of volume; its specific gravity is 3.29. According to Le Chatelier it is not affected by pure water, but will set rapidly in carbonated water, forming crystalline calcic carbonate, and is easily decomposed by solutions of ammonia salts. Rebuffat asserts that it may exist in both an active and inert state.

MONO-CALCIC SILICATE is a stable, white crystalline substance of high optical activity in polarized light. According to Le Chatelier and Richardson it has little or no hydraulic properties, and hence will not set or harden under water, or be decomposed thereby; but in water containing carbonic acid it will harden. Its specific gravity is 2.90.

TRI-CALCIC ALUMINATE is a white, crystalline, isotropic substance, having no optical activity in polarized light. It is easily fused to a white slag. When pulverized and mixed with water it heats strongly and sets very quickly like plaster of Paris, but it is unsound and disintegrates when placed under water. It does not withstand exposure to steam. According to Le Chatelier the hydrate is unstable and loses some of its water in warm and dry air. In contact with distilled water it decomposes until the water is saturated with lime, or contains 0.22 gram of lime per liter. Its specific gravity is 2.91.

DI-CALCIC ALUMINATE is similar in appearance and optical behavior to tri-calcic aluminate, except that it crystallizes from a state of fusion in dendritic forms, while the other substance crystallizes in elongated octahedra. According to Newberry, when the powder is mixed with water it heats strongly and sets very quickly, but remains sound and hardens under water and also in steam. Its specific gravity is 2.79.

TRI-CALCIC DI-ALUMINATE ($3\text{CaO}, 2\text{Al}_2\text{O}_3$) is a white, easily fusible, crystalline substance, of high optical activity in polarized light. According to Le Chatelier, it will heat and set quickly with cold water and remain sound, except that if agitated with an excess of water some of the lime and alumina will dissolve. It is not stable in boiling water or steam. Its specific gravity is 2.92.

MONO-CALCIC ALUMINATE is a white, easily fusible, crystalline substance of high optical activity in polarized light. According to Le Chatelier, its behavior with cold water is the same as that of the preceding aluminate. This substance, however, cannot be formed under normal conditions in Portland cement clinker, as there is always sufficient lime present to form more basic compounds like the preceding aluminates. According to Richardson, its specific gravity is 2.90.

CALCIC ALUMINATES.—The anhydrous calcic aluminates are all somewhat soluble in water, some of the lime and alumina becoming dissolved. The hydrated residue, however, is only sparingly soluble. Le Chatelier states that by agitating pulverized anhydrous calcic aluminate for five minutes with an excess of water, 0.5 gram of this substance may be dissolved per liter, or 0.05 per cent.; but hydrated crystals are soon afterward precipitated, and finally no measurable quantity of aluminate is left in the liquid. Pats of calcic aluminates usually crack badly after drying and exposure to the sun for a few days.

Tri-calcic aluminate mixed with calcium sulphate and

water forms a double compound which crystallizes with a very large quantity of water. In like manner di-calcic aluminate combines with calcium chloride, but the combination is destroyed in the presence of an excess of lime. Magnesium sulphate causes a decomposition of the calcic aluminates, which is the principal reason for their disintegration in sea water.

CALCIC FERRITES, according to Le Chatelier, swell like quick-lime when first exposed to water, and then reduce to a white hydrated tri-calcic ferrite which is decomposed by carbonic acid, producing brown ferric oxide and free lime. According to Newberry, di-calcic ferrite ($2\text{CaO}, \text{Fe}_2\text{O}_3$) is readily formed by fusion to a black slag. On being pulverized and mixed with water, the powder showed no evolution of heat and did not set or harden in air or cold water, but a pat placed in steam hardened rapidly and remained constant in volume. Mono-calcic ferrite ($\text{CaO}, \text{Fe}_2\text{O}_3$) forms large crystals having a metallic lustre and a specific gravity of 4.69.

COMPOUNDS OF LIME, SILICA, ALUMINA AND IRON OXIDE.—According to Le Chatelier, a fusible silico-calcic aluminate and ferrite is often found in Portland cement. This compound is represented by the formula ($3\text{CaO}, \text{Al}_2\text{O}_3, \text{Fe}_2\text{O}_3, 2\text{SiO}_2$), and seems to be identical with the principal constituent of crystalline blast-furnace slag, in which the ferric oxide partially replaces the alumina. This substance is inert in water and does not appear to be attacked by carbonic acid. If quenched in cold water while in a fused condition, its properties become entirely different, as it will then combine with hydrated lime in setting and form calcic silicates and aluminates identical with those formed by other reactions during the setting of Portland cement.

LIME OR CALCIUM OXIDE in its caustic state will absorb water to the extent of 33 per cent. of its weight, and form calcium hydroxide ($\text{CaO}, \text{H}_2\text{O}$). The combination is attended with a great rise of temperature, the swelling and bursting of the fragments and their ultimate reduction to an impalpable white powder, which has a specific gravity of 2.08 and a volume about 3.5 times that of the originally hard and compact material. At a temperature of 15° C , 100 parts by weight of water will dissolve 0.14 part of lime,

while at 100° C . the same quantity of water will dissolve only 0.07 part of lime. Exposed to the air, the solution will become covered with a thin film of calcium carbonate, owing to the absorption of carbonic acid.

When heated in the electric furnace to a temperature of $2,000^\circ \text{ C}$., lime appears to become volatile, and deposits on the cooler parts of the chamber in the form of crystals; at about $3,000^\circ \text{ C}$. it fuses and boils. On solidifying from the melted state it assumes a crystalline structure, forming transparent cubes having a specific gravity of 3.4.

CALCIUM SULPHATE OR GYPSUM ($\text{Ca}, \text{SO}_4 + 2\text{H}_2\text{O}$) is a white, crystalline substance sparingly soluble in water. At 0° C . 100 parts by weight of water will dissolve 0.19 part of anhydrous sulphate (Ca, SO_4), at 40° C . 0.214 part, and at 100° C . 0.174 part. Its solubility is considerably increased if the water contains certain other mineral salts and acids. If heated to about 125° C ., gypsum loses most of its water of crystallization and reduces to a powder which is called plaster of Paris. On being moistened, this powder recombines with some of the water, sets quickly with some evolution of heat and hardens. Heated to 200° C ., all the water of crystallization is driven off and the gypsum is said to be "dead-burned," in which state it will recombine very slowly with water, but without hardening. Burned at 500° C ., it again acquires the property of hardening when mixed with water, although the process is very slow.

MAGNESIA (MgO) is a white, nearly infusible substance having little coherence. In the form of powder its specific gravity is 3.20, but if brought to white heat it becomes denser and attains a specific gravity of 3.65. It may be melted in the electric furnace at a higher temperature than required for fusing lime, and will form crystals on cooling. It is nearly insoluble in water, but combines with a portion thereof to form magnesia hydrate ($\text{MgO}, \text{H}_2\text{O}$), in which process a swelling or increase of volume occurs. Calcined with silica and alumina, it combines therewith like lime, forming magnesium silicates and aluminates. A number of authors state that these compounds possess the property of hardening under water, but Newberry's experiments, previously cited on p. 161 of Vol. XVI. of THE MUNICIPAL JOURNAL AND ENGINEER, demonstrate the contrary.

(To be Continued.)

MUNICIPAL OWNERSHIP IN CANADA

IN the return of reproductive undertakings operated by municipalities in Ontario, it is stated in an official report that out of 14 cities, 106 towns and 134 villages, to which forms of inquiry were sent, returns had been received by the 18th of November, 1903, from 12 cities, 90 towns and 118 villages. Of these, 11 cities, 57 towns and 21 villages had been carrying on reproductive undertakings, and a number of the others reported that they were about to acquire water works or electric-lighting plants. There are 79 municipalities in Ontario which own their water works, 35 which have their own electric-lighting plant, 4 which supply electricity, 2 supply gas, 2 have municipal cemeteries, 1 possesses a dock and 1 operates its own street railway. There was an average annual loss on the municipal street railway and electric-lighting system combined at Port Arthur of \$1,370.95, for the pe-

riod of four years ended Dec. 31, 1902. Profits are shown in 44 cases and losses in 48. In one case there was no profit or loss, and in 23 no reports were made. The municipal gas plant at Brockville, which was established in 1901, realized an annual profit of \$4,000 on an invested capital of \$85,000, but the natural gas sold by the corporation at Kingsville showed a loss of \$243.38 on an invested capital of \$27,000. The business of supplying electricity to consumers by municipalities has been begun too recently in most cases to admit of statistics of profit and loss. In Bracebridge there was an average annual profit of \$620.28 on electric lighting and electric supply combined, which were first provided by the town in 1895; but at Hespeler, where the system was established in 1900, there was a loss of \$3,084.60 on an invested capital of \$15,483.48.

PREACHING VERSUS PRACTICE

The Fallacies of Private Tramway Operation in English Cities Shown Up by the "Municipal Journal" of London—Municipal Ownership Successful

REFERRING to the cry of insufficient depreciation raised by the opponents of municipal trading, especially in relation to tram way undertakings, the *Municipal Journal* of London proceeds to show that in practice they themselves fall far below the standard they effect to set up. Whether depreciation should or should not be allowed, or what relation the sinking fund bears to general reserves, is not discussed. But it is assumed, for the sake of argument, that depreciation, apart from any loan service, should be provided for as critics contend and the genuine nature of their assertions is then tested by showing to what extent they comply with their own rules for keeping their undertakings financially sound.

AVERAGE RATE OF DEPRECIATION

The chief difficulty, of course, lies in ascertaining what is the average rate of depreciation that should be allowed. Even experts vary widely in opinion on this crucial point, and obviously a great deal depends on local conditions. Mr. T. Tinner, in an interesting paper he read on the subject at the end of last year before the Incorporated Accountants' Students Society of London, quoted accepted rates for machinery and other plant varying from 5 to 15 per cent., and stated further: "Tramways and electricity companies, whose undertakings are purchasable by the local authority, should fix the rates of depreciation so that their properties at the end of the term of the concession will not stand in their books at a sum larger than they are likely to receive from the purchasers." Mr. J. W. Best, speaking at a meeting of the Sheffield Society of Chartered Accountants not long ago, also on the subject of tramway depreciation, said that an undertaking belonging to a limited company managed by commercial men would not be regarded as soundly financed unless the directors "not only kept up the revenue-producing character of the undertaking by necessary or desirable repairs or renewals, but out of revenue accumulated a fund equal to the difference between cost and the residual value." This would mean practically an allowance of about 1 per cent. for such a fund alone for an undertaking lasting for 30 years. Lastly, we may recall the definition of depreciation given before the Select Joint Committee on municipal trading by Mr. J. M. Fells, himself an accountant and a member of the council of the Industrial Freedom League. "Depreciation represents wear and tear of plant and machinery, and so on," he remarks, "and goes on whether any provision is made for it or not. It is, in point of fact, a charge upon the ordinary cost of working or receipts; it is capital that is worn out daily, weekly or yearly as the case may be."

NOISY CRITICS IN GLASS HOUSES

These opinions are quoted in order that the professional view of the matter may be had clearly in mind and that there shall be done no injustice to the companies in looking for some evidence in the conduct of their undertakings that they practice all they preach. There is no general rate of de-

preciation agreed on as applicable to tramway concerns; but for the sake of convenience we may take the figure as being 4 per cent., which *The Accountant* has suggested as the proper minimum annual allowance that electric lighting companies ought to make under the same head. The British Electric Traction group of tramway undertakings is chosen for the purpose of seeing how companies fulfill their own requirements for obvious reasons. The financiers connected with this big combine are amongst the noisiest critics of municipal ventures, and we must therefore suppose they are the most scrupulous in avoiding the heresies they so loudly condemn.

HOW PRACTICE DIFFERS FROM PREACHING

The following table shows the result of the examination of the accounts of 12 of the subsidiary or allied companies for 1903 that have so far been published:—

Company.	Capital outlay.	Net profit.	Amount	Ratio to capital outlay. p. c.	Depreciation, renewals, or reserve.
					*
Birmingham and Midland.....	\$1,505,130	\$ 98,165	\$45,000	3	
Devonport and District.....	722,615	18,435*	5,000	1 1/4†	
Dewsbury, Batley, and Bristol.....	227,420	16,035	2,500	1	
Dudley, Stourbridge and District.	1,784,590	65,390	10,000	5 1/2	
Gravesend and Northfleet.....	610,490	16,525	5,000	3 1/2	
Greenock and Port Glasgow.....	1,121,215	54,030	7,500	3 1/2	
Leamington & Warwick.....	190,315	9,050	3,500	2	
Oldham, Ashton and Hyde.....	751,655	34,420	5,000	5 1/2	
Poole and District.....	338,935	28,345	5,000	1 1/2	
Potteries	2,413,100	132,290	10,000	3 1/2	
Swansea	1,202,010	26,820*	Nil.	Nil†	
Tynemouth and District	451,870	30,510	7,500	1 1/2	

* Six months. † Per annum.

The average rate shown by the table, omitting the Swansea company, is not quite 1 1/8 per cent., an amazing result when one remembers that the clique responsible for the management of these concerns consist of those who perpetually assert that municipalities never make adequate allowance for depreciation. One would have thought that after committing themselves so fully to the theory of generous depreciation they would at least have made more than a pretence of allowing for it in their own case. What they do is a pretence and nothing more, and there is not even an approximate agreement as to the principle on which the scanty provision shown should be made. The net profits given in the table are before deducting depreciation, and permit of dividends ranging from 2 1/2 to 10 per cent. per annum being paid. If the suggested rate of depreciation at 4 per cent. be adopted considerable inroads would be made on these profits, and the shareholders would get a much smaller return, and in some instances none at all.

WHAT SHOULD BE THE RESULT?

The appended table shows the profit remaining to each company after the depreciation actually allowed is deducted, and the surplus or deficit that would be left if depreciation at 4 per cent. were struck:—

Company.

	Net profit after Surplus or deficit deduction of depreciation at declared depreciation at 4 per cent.
Birmingham and Midland	\$ 53,265 S \$37,980
Devonport and District	12,435 S 2,985
Dewsbury, Batley, and Bristol	13,535 S 6,940
Dudley, Stourbridge, and District	55,390 D 5,995
Gravesend and Northfleet	11,525 D 7,890
Greenock and Port Glasgow	46,530 S 9,180
Leamington and Warwick	5,550 S 1,435
Lougham, Ashton and Hyde	29,400 S 4,355
Foole and District	23,345 S 14,790
Potteries	121,290 S 34,765
Swansea	26,820 S 2,780
Tynemouth and District	23,010 S 12,435
(S) Surplus. (D) Deficit.	

MUNICIPAL AS OPPOSED TO COMPANY PRACTICE

In order to show the startling difference between the practice of the British Electric Traction combine, and that of municipal undertakings, there is indicated below the allowance made for depreciation, renewals, or reserve by a number of corporation systems. An excellent table, used for this purpose, compiled by the *Tramway and Railway World*, is given below, so that the statistics cannot be said to be taken from a source too favorable to municipalities. The table includes 45 towns and deals chiefly with accounts ended 31st March, 1903. The number of authorities in the table making allowance for depreciation is 24, and these are referred to only because this article is concerned with the different rates of depreciation shown rather than with the principle. The municipal record is as follows:—

Depreciation, renewals or reserve.

Municipality.	Capital Expenditure.	Amount.	Ratio to capital outlay, per cent.
Aberdeen	\$ 1,329,240	\$ 71,600	5 3/8
Aye	371,105	18,675	5
Birkenhead	1,704,360	17,990	1
Bolton	2,357,755	49,715	2 1/8
Burnley	532,225	12,875	2 3/8
Darwen	395,135	5,250	1 3/8
Dundee	283,170	6,700	1/2
Glasgow	12,571,300	764,160	6
Huddersfield	2,014,000	43,595	2 1/8
Hull	1,727,275	53,365	3 1/8
Leeds	5,199,755	70,525	1 3/8
Liverpool	9,164,885	251,665	2 7/8
London	7,522,315	55,000	3/4
Manchester	6,131,160	16,270	3 1/2
Newcastle	4,511,370	16,250	3/8
Nottingham	2,671,935	7,250	2 3/8
Salford	2,205,640	15,040	3/4
Sheffield	4,427,405	74,395	1 3/4
Southampton	917,395	21,845	2 1/2
Sunderland	1,292,225	25,155	2
Walslesey	580,225	22,500	4
Warrington	437,515	3,250	3/4
Wigan	915,840	7,445	3/4
Wolverhampton	836,315	10,475	1 1/2

MORE THAN DOUBLE THE COMPANIES' RATES

The average rate allowed is 2 5/8 per cent., or more than double what Mr. Garke and his friends think sufficient for their companies, though none of the latter has the perpetual tenure that corporation lines possess. And this depreciation is provided out of profits on which there is a heavy lien for debt service such as no private undertaking has to face. It is really difficult to know which to be most astonished at, the impudence of a criticism which sets up a standard its advocates do not believe in sufficiently to put into practice, or the daring reliance on public credulity which the critics apparently hope will fail to detect their disingenuousness.

The matter is worth following out a little further. In the

table of British Electric Traction concerns there is not included here the Metropolitan Electric Tramways, a big combine of itself which has practically swallowed up the North Metropolitan Tramways company and the Harrow Road and Paddington Tramways Company, is leasing the Middlesex County Council's Light Railways, and is to all intents and purposes the North Metropolitan Electric Power Supply Company, which captured the electric light undertaking of the Willesden Urban District Council. This combine has much of its properties in a transition or nebulous state, and so perhaps holds itself excused from raising the question of depreciation.

THE GLASS HOUSE OF THE B. E. T. CO.

The same may be said about the British Electric Traction Company itself. The position at present is simply this—over £3,000,000 of the capital is invested in the securities of subsidiary concerns which are entered in the balance-sheet at par or cost. No provision is made for depreciation, and the auditors are careful to state that they do not certify as to the value of the securities. There is a reserve of £50,000, but only £20,000 has come out of earnings, and not half of it is represented by investments outside the group.

Take another associated business in which the British Electric Traction Company is considerably interested, and which is under contract to supply it with all the electric apparatus and rolling stock it requires—the Brush Electrical Engineering Company. This concern has paid nothing on its ordinary shares for three years, and only began to think about the question of depreciation and reserves in 1897. As a consequence, it finds itself with a total fund in hand of about £60,000, of which £40,000 is hypothecated for buildings, plant, and machinery. This leaves £20,000 for general purposes, and against that sum there is an item for patents and goodwill amounting to £181,400, the figure to which it was reduced in 1896 when the capital was written down by £90,000. The auditors on three occasions have pointed out the desirability of dealing with this item, as patents which are represented in it lapse every year. Another significant remark by the auditors is worth quoting:—"The shares and debentures entered in the balance-sheet at or below cost price for the most part have published prices, and the values at such prices are slightly less than the figures in the accounts. We are unable to verify the value of those not having published prices."

REFORM SHOULD COMMENCE AT HOME

Other great companies that make war on municipalities have no better record. The London United Tramways, for instance, with nearly £3,000,000 of capital and owning 60 miles of track, puts by nothing for depreciation and has not a farthing of reserve. Its gross revenue last year increased 26 per cent., but all the gain was eaten up by the extra expense of operation, and the net income remained practically stationary. It maintained its old rate of dividend on the ordinary capital, 8 per cent., but at the cost of provision for the future. "The directors had anticipated," said the report, "that under ordinary circumstances the profits of the year would have been sufficient not only for the dividend, but to set aside a very substantial sum to a reserve fund, the establishment of which the shareholders would probably prefer should now be deferred until the next annual account."

MUNICIPAL ASPHALT PLANT

Detroit, After Several Years' Delay, Finally Installs New Plant—First Operation Demonstrates Its Economy

By E. G. Pipp

AFTER a trial of five weeks on patching, Detroit officials believe their municipal asphalt plant is a success, a money saver, and produce figures to show for it. No work has been done yet on resurfacing, repairing or new paving, although work of this kind is laid out for the near future.

The plant was installed this spring at a cost of \$15,000. Actual work was commenced June 8, and continued to this date without a hitch of any kind, not even a bolt to be replaced or a shut down on account of a hot box. Three streets have been patched, two gangs being at work most of the time. The price paid by the city for this class of work last year was \$1.12 a yard, about 10 cents a yard under the average price of previous years. The average cost of the work done in the five weeks of operation is 86 8/10 cents a yard.

The wage scale can be best judged by giving actual figures, eight hours constituting a day's work by resolution of the common council.

Wage scale at plant: Foreman, \$4.00 a day; kettleman, \$2.80; night kettleman, \$2.50; night watchman, \$2.50; mixer, \$2.50; sand man, \$2.00; engineer, \$3.00; fireman, \$2.00; laborers, including feeders, \$1.75; boy, \$1.00; teams for hauling from plant, \$4.00; clerk and bookkeeper, \$2.50 to \$3.50.

Wage scale on street: Foreman, \$3.50; rakers, \$3.00; tampers, \$2.50; smoothers, \$2.50; laborers, \$1.75; roller man, \$3.00; watchman, \$2.25; teams, \$4.00.

Cost of material delivered on cars in city's yard; Venezuela asphalt, \$25.50 a ton; asphaltic oil, \$25.90 ton; binder stone, 90 cents a ton; sand, 56 cents a cubic yard; limestone dust, \$3.50 a ton; wood, \$3.65 a cord; coal, mine run, \$2.65 a ton.

The largest haul to the streets was six miles to Woodward avenue, the shortest about a mile. On Woodward the patches run small in yardage, but deep. The average

weekly wages at the plant, including office and teaming, was, \$425.91, a total of \$2,129.56 for five weeks.

Three gangs worked on the street about two weeks, then two. The weekly average of each street gang was, \$261.33, a total of \$3,135.96 for all street gangs the five weeks. This included teaming for old materials and night watch.

There was some cost for unloading the materials off cars, which, with interest on the investment at 6 per cent. and allowing \$1.00 for repairs although not a cent was spent, makes a total of \$387.32.

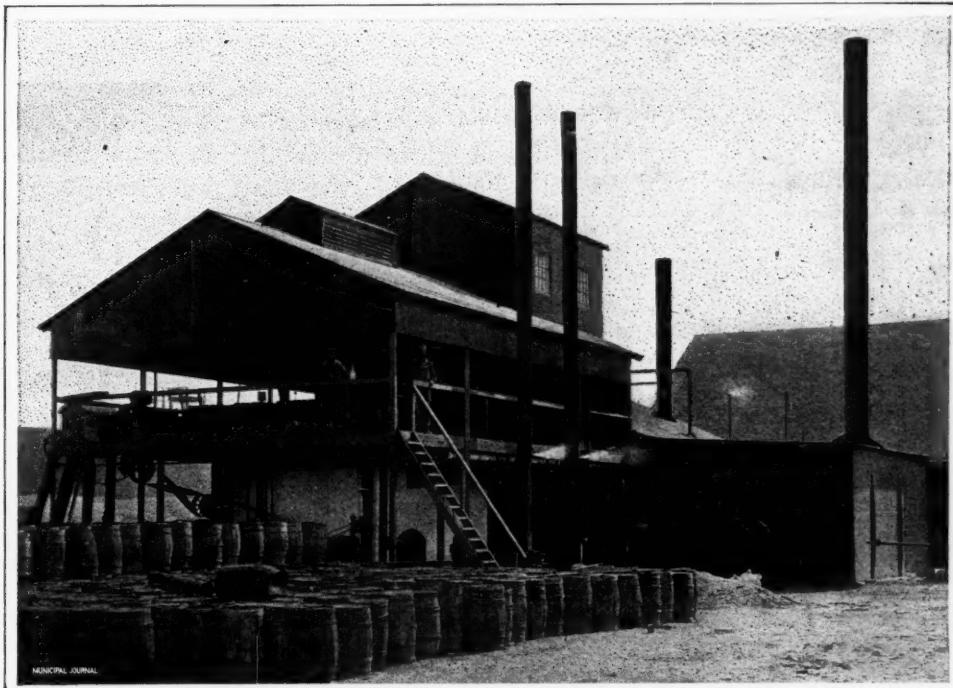
The old oil barrels were sold, also screenings, and some work was done along track for street car company, making an income of \$150.

The salary of Superintendent C. A. Proctor is not figured in the table at end of article, for the reason that the city had to pay him last year the same for inspecting the work of the contractors that it pays him this year for superintending. This year he has charge of new paving by contractors as well as superintending plant.

His salary is \$50 a week, and could be figured into above costs by cities that may contemplate doing their own work.

Mr. Proctor says the work being confined so far to patching makes the labor cost per yard for help at plant run high, and he looks for a reduction when he gets to resurfacing or other straight work.

While he offers no apologies for this work and rate, he calls attention to the fact that it was done while organizing new gangs all the way through. He has a good many experts employed formerly by old companies, but put on many new laborers and it took a little time to get them adjusted to each other and to working smoothly. The yardage laid by a gang the last week shows an increase over the 1st, 2nd or 3rd week.



MUNICIPAL ASPHALT REPAIR PLANT OF DETROIT

The mixture for the top was 808 pounds sand, 75 pounds dust, 114 pounds asphaltic cement, which figured at 96 per cent. pure, gave about 11 per cent. bitumen. This, Mr. Proctor says, is a better quality of material than the city has been getting in its patching contracts.

The material used was as follows:

115.8 tons asphalt at \$25.50	\$2,952.90
52.17 " asphaltic oil at \$25.90	1,351.60
671.76 cu. yds. sand at .56	376.18
293.90 tons binder stone at .90	264.51
84.96 " lime stone dust at \$3.50	297.36
83 " coal at \$2.65	219.95
28 cords wood at \$3.65	102.20
Lubricating oil	18.00
Cement	13.35
 Total	 \$5,596.05

Recapitulation:

Materials	\$5,596.05
Labor at plant	\$2,129.56
" on street	3,135.96
Unloading, etc	387.32
 Total	 5,652.84

Total	11,248.89
Less Receipts	150.00

Net cost	\$11,098.89
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Yardage:

Woodward avenue	3,837.10 yds.
Lafayette avenue	7,642.38 "
Fort street	1,296.71 "

12,776.29..

Average cost per yard	86 8/10
Cost of material per yard	43 8/10
Cost of labor, etc., less receipts	43

Basis of Last Year's Contract:

Cost of 12,776.29 yds., at \$1.12	\$14,309.44
Actual cost to city	11,098.89

Saving	3,210.55
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Public Utilities in Leeds, England *

As the subject of the municipalization of public utilities is at the present time attracting close attention in American cities, especially in Chicago, the results of such a policy in English cities will be pertinent and interesting to the American people. Leeds, England, is an example in this way.

The following is the financial result of the operation of the street railways, or tramways, as they are called in that city, for the twelve months ended March 25, 1903 and 1904:

Receipts.

From—	1902-3.	1903-4.
Electric traction	\$1,273,213.17	\$1,349,454.83
Steam traction	2,460.92	.....

* U. S. Consul Hamm, Hull, Eng., in Daily Consular Reports.

Manure	15.88	14.92
Rents, advertisements on cars, etc.	11,034.75	12,543.13
By discounts	1,427.83	1,522.34
Total	\$1,288,152.55	1,363,535.22

Expenditures.

For—	1903.	1904.
Generating station	\$62,254.08	\$64,873.10
Less amount from lamp committee for supply of current	3,304.61	4,154.73
Traffic outlay, including salaries, wages, etc.	\$58,949.47	\$60,718.37
Less amount received for ticket advertisements .....	.....	1,946.22
Maintenance, cars, and equipment	\$358,309.74	\$361,678.21
Permanent way	125,268.89	116,328.98
General expenses	68,670.79	107,129.80
Engine haulage	84,596.93	77,773.85
Gross profit	9,495.25	.....
Depreciation	\$705,292.07	\$723,629.21
Interest (estimated)	887,939.95	\$1,363,535.22
Net profit	68,547.54	72,289.72
Redemption fund charges	13,249.68	28,550.83
Surplus	129,605.51	126,845.40
.....	\$371,242.66	\$416,619.79
Redemption fund charges	69,922.66	128,345.49
Surplus	\$301,320.00	\$286,074.30

The gross income, it will be seen, is \$1,363,535.22 and the operating and maintenance expenses \$723,629.21, leaving a gross profit of \$639,906.01. From this last sum are deducted various charges for depreciation, income tax and interest, leaving a net profit of \$416,619.79. And after redemption fund charges of \$128,345.49 were taken from this, a surplus of \$286,074.30 was left and turned over to the city treasurer to be used in reducing the city taxes. This is the largest profit shown by the tramways in any city in the United Kingdom.

It should be remembered also that the fares on the Leeds tramways are 2 and 4 cents (American money), that advances in wages have been given employees the past year, and that every three months bonuses are allowed motormen who perform their duties without accident. So the public is benefited in two ways—by having low street car fares and by a reduction in taxation.

Electric lighting is another public utility owned and conducted by the city of Leeds. The result of its operation for the twelve months ended March 25, 1904, as compared with the twelve months preceding, is given in the following table:

Receipts and expenditures.	1902-3.	1903-4.
Receipts from sales for lighting	\$249,155.64	\$324,711.88
Receipts from sales for power	23,071.34	43,290.20
Sundries .....	.....	0.96
Total receipts	\$272,227.00	\$368,003.04
Working expenses and costs incidental to change of system	94,062.02	127,251.52
Gross profit	\$178,164.98	\$240,751.52
Interest and sinking fund	171,436.50	224,079.24
Surplus	\$6,728.48	\$16,672.28
Units sold	4,448,650	6,871,186
Average price per unit	\$0.0604	\$0.058
Expenses per unit, including interest and sinking fund	\$0.059	\$0.0554
Surplus per unit	\$0.0014	\$0.0026
Capital expended during the year	\$808,616.94	\$394,132.52
Total capital expended to end of year	\$3,263,060.26	\$3,657,188.88

Appended is an analysis of the revenue of the department and other details down to date:

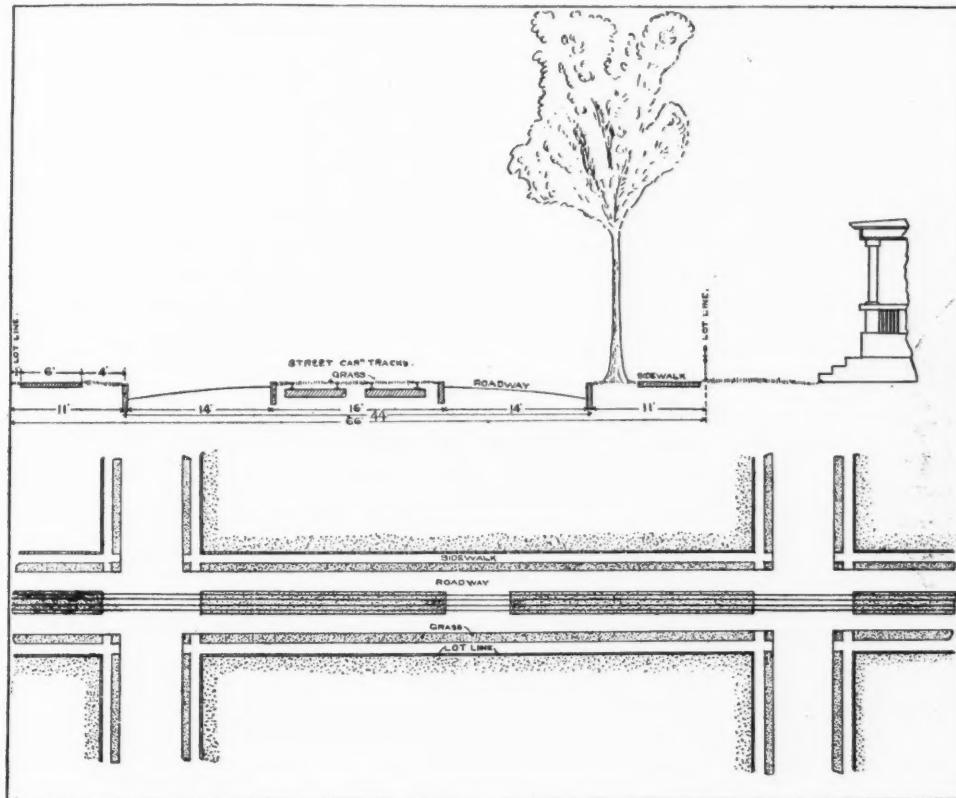
Description.	1902-3.	1903-4.
<i>Lighting.</i>		
Number of 35-watt lamps installed at present date	.....	234,263
Number of 35-watt lamps installed March 25, 1903	195,834	.....
Increase during year.....	.....	*39,429
Increase during previous year.....	†34,537	.....
Units sold:		
Private lighting	3,418,383	4,428,657
Street lighting	124,829	177,170
Total units sold.....	3,543,212	4,605,827
Revenue	\$249,155.64	\$324,711.88
Average price	\$0.0694	\$0.0696
Units sold per lamp installed.....	19.99	20.88
<i>Power and heating.</i>		
Aggregate horse-power of motors installed at this date .....	.....	2,903

Aggregate horse-power of motors installed March 25, 1903	1,436	.....
Increase during the year.....	.....	\$1,467
Increase during previous year.....	5751	.....
Units sold	905,438	1,665,359
Revenue	\$23,071.36	\$43,290.20
Average price per unit.....	\$0.0252	\$0.0256
Units sold per horse-power installed.....	837	732
Revenue per horse-power installed.....	\$21.34	\$18.88

* Or 20. per cent. † Or 21.4 per cent. ‡ Or 102.2 per cent. § Or 109.6 per cent.

The net profits—\$16,672.28—look small, but it must be remembered that \$224,079.24 were deducted from the gross profits for interest and the sinking fund; besides, light and power were supplied at a moderate price.

The result of these two experiments in the municipalization of public utilities in Leeds will be found a profitable subject for study by American Cities.



A SUGGESTION FOR BEAUTIFYING RESIDENCE STREETS BY SODDING BETWEEN CAR TRACKS—
66-FOOT ROAD

Courtesy John W. Alvord, C. E., Chicago.



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Samuel Milton Jones

IF it be the province of genius to do those things which other men have merely thought of doing, or to crystallize into practice theories hitherto regarded as Utopian, then the late Samuel M. Jones, sometime Mayor of Toledo, was undoubtedly a genius.

The greatest legacy that Mayor Jones left to the world and to his children was the example of his life and the purity of his character. That he

was not without guile is evidenced in the many quaint anecdotes told about him wherein he evinced a shrewd but homely diplomacy in the handling of men. He once obtained a postage stamp without parting with the necessary collateral, by the exercise of quick-wittedness, and on another occasion raised some woefully needed money for himself and his impecunious companions by collecting toll at a bridge that belonged to the State. These harmless little pecadilloes are mentioned lest, in our admiration for the sturdy honesty of his character, we are led into the error of concluding that he was not essentially human.

It would be difficult to find an historical parallel for the character and career of Mayor Jones. From the point of view of humor and for sheer quaintness and indifference to the claims of dignity, he had much in common with the most unique of the civic magistrates of fiction—the Sancho Panza of Cervantes. Looking to higher and nobler examples, he



veiled his inexorable steadfastness of purpose under a superficial gaiety and homely humor not unlike that of Lincoln, and in absolute brotherhood with his inferiors in wealth and ability he deported himself in a manner similar to one of our ablest men of genius on the roll of history—Peter the Great.

Although born in Wales, Mayor Jones was a finished product such as only this country could produce. He came from that section of Great Britain which gave to the world the indomitable Stanley and the greatest of actor-managers—Ivory. It is more than possible that in his veins ran much of that Celtic blood which flows around the world and enriches every shore that it touches. A rare personality was his—so strong that at his death it called forth formal tributes of respect and love from such widely divergent associations as the Epworth League, the University extension and the Bartenders' Association.

In politics, Mayor Jones was a law unto himself. Therefore, while he was a politician in the higher sense, he was not a conventional one. An idealist, whose lack of early training and scholarship was the cause of his many idiosyncrasies, it was difficult for him to reason from cause to effect, nor did he arrive at conclusions by processes of logical reasoning. But when he came before his own people and asked for their votes, his strong, wholesome, homely personality won for him their love and their acclaim and they hailed him after the manner of Kipling's Kim, as a friend of all the world.

A lively account of some of his campaign methods was given some years ago by Dr. Washington Gladden in the *Outlook* from which we quote a few sentences:

"Democracy, as he understood it, rests on Christ's law of love, and this is what he preached up and down the streets of Toledo, in season and out of season. It must have been rather a bewildering moment to the average politician when Mayor Jones stepped upon the platform at the last meeting before the election, in the great armory packed with voters amid a tumult of applause and cries of 'What's the matter with the Golden Rule?' 'What's the matter with Brotherhood?' It was a notable speech which followed. Mayor Jones declared that he had sought to discharge the duties of his office in such a way as to bring the blessings of good government to all the people. He spoke rather sadly of the opposition of some whose friendship he might have reckoned on. 'It is not pleasant,' he said, 'to be counted among the disreputable, to be classed as a 'demagogue' and a 'dangerous man'; but there is comfort in the reflection that men at whose feet I would count it an honor to sit, have been called demagogues.'"

Much criticised by the ultra-conventional and the conservative during his public life time, none were found so base or so bitter as to malign him after he had laid down the burden of life. It is pleasant to read of him in one of the most conservative of the Eastern journals, whose principles were the very antithesis of those of the dead mayor, that "He lived up to his principles, and, besides paying his employees as good wages as he could, he less than three months ago gave them stock in the Golden Rule Trust, as his company is now called, to the value of \$10,000. In giving it to

them, he said: "You may do with it exactly as you please. I only hope that you will keep it intact and use the income in the spirit of the Golden Rule, but there are no strings to it." He said of himself in a sort of biography issued as a campaign document in his gubernatorial campaign that he raised wages and shortened hours both in his factory and in his oil fields, declared 5 per cent. Christmas dividends for his employees, and gave them a week's vacation every year. He established Golden Rule Park, where good music and good speaking are furnished the year around."

Mayor Jones believed with Shelley that men need both work and leisure and that too much of either is not wholesome nor desirable. He tried as best in him lay to improve labor conditions. He declared that the "going wages" rule should not govern his factory, but, on the contrary that "every man is entitled to such a share of the product of his toil as will enable him to live decently, and in such a way that he and his children may be fitted to be citizens of the free republic, should be the rule governing the wages of our establishment."

Regarding his theories of municipal government, Mayor Jones wrote and spoke a great deal. If his mental equipment had measured up to his high moral worth, he might have evolved a lasting improvement upon existing systems. It is, however, without point to criticise his political or social theories. He was the author of two complete books, apart from his notes and addresses, but it is not likely that they will long attract attention. The grandeur of his character over shadowed his mental attainments and it is as a man and not as a theorist that he will live in the hearts of the people.

Not only was the Golden Rule the political platform on which the late mayor stood, but it was the precept on which he tried to base every act of his life. Hypocrisy, or humbug had no part in his broad and expansive nature. He was *sui generis* in that he dominated his fellows by sheer force of character, rather than by argument, and by love rather than force or cunning. His life was by no means a bed of roses and from the time of his early struggles for a foothold on the platform of prosperity, up to the period when he had fulfilled a measure of his ambition, his actions were misconstrued by a great many of his fellow men. But

"Like some tall cliff that rears its awful form,
Swells from the vale and midway leaves the storm:
Though round its base the lowering clouds may spread,
Eternal sunshine settles on its head."



The Repair of Streets

Too little attention is given in American cities to the maintenance of streets. This is more largely due to lack of funds and the opposition of the general public to the expenditure of adequate sums for pavement maintenance than to the negligence of city officials. The public believes, or seems to, that when a good pavement is once laid that it will take care of itself, regardless of the fact that it is often ripped up to lay new gas or water mains, or to repair old ones, and that it is constantly subjected to heavy traffic, to say nothing about the wear and tear of the elements. No city can have good pavements for long, no matter how well laid they may have been to start with, unless careful atten-

tion is given to their maintenance. *The Dispatch*, of Columbus, Ohio, pertinently remarks on this subject:

"The magnitude of the improved street problem now before the city government is very well shown in a statement which has just been prepared by Engineer Griggs for the City Council. According to that statement there are in the city 120 miles of paved streets, 65 per cent. of which is brick, 15 per cent. asphalt, 8 per cent. stone block, 7 per cent. boulder and 5 per cent. macadam. The cost was \$5,200,000.

"The engineer estimates that to maintain these pavements \$65,000 should annually be expended for repairs. That would mean the expenditure in the course of 80 years of an amount equal to the original cost. But within that time he estimates that every pavement will, in addition to the repair, have to be renewed from one to six times.

"Asphalt pavement, of which there is in the city about 20 miles, deteriorates more rapidly than any other kind. A hole, it is estimated, increases in size 2 per cent. a week, though the engineer cites the case of one hole in an asphalt pavement which increased 113 per cent. in 60 days.

"Though with streets of other material the deterioration is less rapid, there is wisdom in the continual repair of all, for besides the loss in the streets themselves there is the wear and tear and breakage of vehicles, the hindrance to fire wagons and the comfort of persons who ride. A notable feature of the communication is the engineer's estimate that the damage to vehicles owing to broken streets is greater than the loss in pavement itself. If that is true, a vehicle tax for street repair, instead of a burden, is an economy to those who own vehicles."

"Why Filter Water to Waste"

It is one of the favorable signs of the times that the newspapers of the country are taking the affirmative side of the meter question. Many of our exchanges have more or less to say about the wisdom of the use of water meters, but none has made a more pertinent utterance than that of the Minneapolis *Tribune*, in a recent issue:

"We are told that one-third of the recorded pumpage has been saved by the installation of new pumps, making a saving of \$45 a day in cost of fuel. That is, the old pumps had to record 25,000,000 gallons daily to furnish the same supply as the new pumps when they record 16,000,000. That is our present daily average, and it will not rise above 20,000,000 in the summer. It is certain that this could be cut down half if meters were universally used, without injury or loss to anybody. People would use all the water they wanted under a meter charge, but they would not let it run wildly to waste as they do now."

"In the last five years about 10,000 meters have been installed, leaving about 15,000 customers, large and small, who use the flat rate. In that time the daily per capita consumption of water has been reduced from 125 to 90 gallons. This result has been brought about in domestic and industrial consumption only, without touching the city, which consumes nearly half the total water pumpage. If the city could be made to use meters this 90 gallons could be cut in two. If only private consumers used them, it could be cut down perhaps one-third. In St. Paul, which

has about the same proportion of private meters as Minneapolis, and the city pays for all water used at the meter rate, they get along with about half our daily pumpage.

"It was bad enough to pay for twice as much water as we needed before. It is worse now that we are going to the expense of filtering it. What is the use of building and maintaining a filter plant twice as large as we need? With perpetuation of present conditions, we should have to provide for filtering 30,000,000 to 40,000,000 gallons of water daily, to allow for the growth of the city. But if we install meters rapidly enough so that reduction of consumption through their use will keep pace with the increase of population, a plant that will filter the present maximum of 20,000,000 gallons might be sufficient for the next generation. We shall continue to press this matter upon the attention of the council."



Voting Machines Save Time and Money

THE use of the voting machine is rapidly spreading. The Pacific coast cities have now adopted them, and in referring to their operation the San Francisco *Chronicle* recently said:

"In adopting voting machines San Francisco is following the example of Santa Clara and Alameda counties. The Board of Supervisors of the latter county has contracted for 100 of the type offered San Francisco. Santa Clara put the machines to practical test at the last election, and the result was eminently satisfactory. They greatly reduced the cost of the election, and the returns were practically all in at the close of the polls.

"The first cost of voting machines is, of course, high. That is to be expected. But the advantages obtained through their adoption abundantly compensate for the outlay. The number of election officers is reduced to a minimum. Clerkships are totally abolished, as the machines keep the record automatically. The secrecy of the ballot is preserved. The final count is quickly made, the only delay occurring after the close of the polls being in the time consumed in bringing the record of the several precincts into the office of the Registrar. Another great advantage contained in the adoption of the voting machine is that it will abolish contested elections, which are both irritating and expensive, while they frequently defeat the verdict of the people as declared in their votes by ballot."



The Plague Still in San Francisco

It is passing strange that the San Francisco health authorities should be so long in rooting out the bubonic plague, when Glasgow, Scotland, a few years ago had more than a score of cases landed within her limits at one time from an infected ship, and within less than five months had every vestige removed and has had no recurrence of the disease since that date. The plague first appeared in San Francisco in 1900, there being twenty-two cases reported that year and twenty-two deaths. In 1901 there were thirty cases and twenty-five deaths; in 1902, forty-one cases and forty-one deaths; in 1903, seventeen cases and seventeen deaths; and in 1904, up to March 1, there have been nine cases and eight deaths, making a total of 119 cases and 113 deaths. The foregoing figures are taken from the regular

weekly report of the U. S. Public Health and Marine Hospital Service. The city, State and Federal governments have all taken a hand in the effort to suppress the plague, and they are to be given credit for confining the plague to the limits of that city, but that is about all the credit they deserve. So long as the plague exists in San Francisco so long will the public health of other cities in the United States remain in jeopardy, and we think it is about time that dilatory measures were dropped and drastic ones adopted for the uprooting of such a menacing evil. The combined efforts of city, State and Federal government should be able to achieve in less than five years what one Scottish city accomplished in as many months; if they cannot it is time they confess their weakness and appealed for help from some outside source, Glasgow, for instance.

Personalities

—Dr. J. E. Morris, city physician of Augusta, Ga., has handed in his resignation to Mayor R. E. Allen.

—Mayor L. G. Pritchard, of N. Fort Worth, recently suggested to the council that a census of the city be taken.

—Hon. Thomas Oliver, a former mayor of Lockport, N. Y., died on July 11. He had been ill for many months.

—Mayor George J. F. Falkenstein, of McKeesport, Pa., has signed a contract for the erection of a garbage furnace.

—Ex-Mayor William G. Thompson, of Detroit, Mich., who was injured in a bicycle accident, died at a sanitarium at Yonkers, N. Y., on July 20.

—A committee has been appointed by Mayor Cullum, of Duluth, Minn., to take up the idea of a public house, advanced by Health Commissioner Murray.

—President John C. Payne, of the street and water board, of Hoboken, N. J., has declared war on all city contractors who do not strictly live up to the specifications in city work.

—Mayor Galagher, of Fairmount, Va., appeared before the Council Committee on Ordinances, July 11, and stated that his town was ready and willing to come in to the corporation of Richmond.

—Recently a committee called upon Mayor Neff, of Kansas City, Mo., to formally thank him and the members of the council for the passages of the ordinance requiring city employees to pay their just debts.

—The municipal election in Olla, La., in July resulted as follows: Dr. W. V. Taylor, Mayor; J. V. Prestridge, Marshal; B. E. Blake, T. J. Mott, R. H. Brooks, J. E. Prestridge and C. C. Jarroll, Councilmen.

—President J. B. Morgan, of the Augusta, Ga., Board of Health, advises the public to boil all the milk used.

—Mayor Cyrus W. Davis, of Waterville, Me., was nominated for Governor by the Democratic State convention on July 14. He was opposed by the Hon. Samuel W. Gould. The vote was 377 for Davis and 80 for Gould.

—Mayor G. D. Worswick, of San Jose, Cal., recently made the appointment of Joseph D. Radford on the board of park commissioners; Dr. John L. Benepe to the board of health, and W. B. Hardy on the board of library trustees.

—The councilmen of Buffalo, N. Y., recently passed, by a rising vote, resolutions expressing the regret of the Board at the death of Robert Bortwick Adam, the eminent citizen

who gave more than fifteen years of his life to the work of the Grade Crossing Commission.

—Mayor Charles S. Bosch, of Hamilton, O., on July 11, rounded his 46th birthday anniversary, and received many congratulations and had a good cigar for friends dropping in at his office. Mayor Bosch was born on a farm near Jacksonburg, July 11, 1858.

—Mayor J. J. Williams, of Memphis, Tenn., in view of the recent excitement in that city, said publicly: "As to my resigning from office, if that is what my political enemies are after, I will state that I intend to retain my title until the legal expiration of my term."

—City Treasurer E. T. Tifft, of Springfield, Mass., has floated the \$40,000 sewer loan for the construction of the Mill River Valley intercepting sewer, the Springfield Five Cents Saving Bank being the purchaser. The loan is a gold registered bond loan at 3½ per cent., and is taken at par.

—The new mayor of Mobile, is Captain P. Lyons, who was chairman of the city council at the time of the death of his predecessor, Mayor McLean, was inducted into office the day following. Aldermen and Councilmen vied with each other in paying a tribute to the integrity and ability of the new mayor.

—On July 9, Judge George W. Wakefield granted a temporary injunction against the Hornick drug store operated by Mayor James Davidson, of Hornick, Ia. Admitting that he brought the action "partly to get even," W. H. Ashmore of Hornick sought to have the drug store conducted by Mayor Davidson restrained from selling intoxicating liquors.

—The resignation of City Treasurer George W. Dickensheets, of Gloucester, N. J., has been handed in. He requested that his books be audited at once so that there would be no delay. Mr. Dickensheets gave as his reason for resigning that a recent act put additional duties on the office in the matter of collecting taxes and this would interfere with his business.

—As a sensational finale to the troubles of Holland, Va., J. R. Holland was indicted by the grand jury on the very day in July of his qualification as mayor of the town. Mr. Holland took the oath of office as the town's chief executive before Judge Prentis in Nansemond circuit court, and almost at the same time the grand jury was up stairs at work on the indictment charging him with selling whiskey without a license.

—Mayor Williams, of Memphis, Tenn., replied to the request of the Committee of Public Safety that he close gambling house as follows:

"Understanding in the above question the term 'gambling houses' to mean gambling of all kinds and at all places, for money and for things of value, I beg leave to state that in response to what I believe to be the demand of the public, as at present indicated by the press and pulpit, that I will do so to the best of my ability."

—Mayor Charles E. McLean, who died at Mobile, Ala., on July 10, from heart and kidney trouble, was a man who had schooled himself in business and affairs. He took a firm grasp of any question presented to him. He had a happy talent for seeing things plainly, brushing aside ornamental

or other encumbrances and getting at the heart of the matter. He did his own observing and thinking, and generally reached correct conclusions. In manner he was courteous and considerate, even with the poorest. Although he had made something of a success in life, he was a man of no personal pretensions, being satisfied to acquit himself of every task to the best of his ability, and without seeking the praise of the world.

Convention Dates

AUGUST

The League of Georgia Municipalities will convene at Savannah, Ga., August 10, 1904. Mayor Bailey, secretary, Griffin, Ga.

The National Firemen's Association will hold its annual convention at St. Louis, Mo., August 22-27. D. W. Gillen, secretary, 176 Monroe street, Chicago, Ill.

SEPTEMBER

The annual convention of the International Association of Fire Engineers will be held at Chattanooga, Tenn., September 14-17. Henry A. Hills, secretary, Wyoming, O.

OCTOBER

League of American Municipalities will meet in seventh annual convention at St. Louis, Mo., October 4-6. Hon. John MacVicar, secretary, Des Moines, Ia.

Will Own Its Own Lighting Plant

THE Village Board of Trustees of Penn Yan, N. Y., has practically decided to let the contract for the construction of the new municipal electric lighting plant which the village is soon to install in connection with the village water plant. There are a few details left to be settled. The village president and clerk are authorized to sign the contract, and it is thought that the new plant will be in working order by the last of September.

The present contract for the lighting of the streets by the Electric Light Company will soon expire, but the company has agreed to keep on lighting the streets at the prevailing rates until the village is able to get its own lights in working order.

Oiling Dusty Streets

STREET CLEANING COMMISSIONER WICKES, of Baltimore, appears to have taken the hint from the steam railroads, for he has decided to experiment on the streets around Baltimore's City Hall with an oil which he thinks will go far toward solving the dust question. Commissioner Wickes has an oil which is easily soluble in water. A 1 per cent. solution will lay the dust and remain on the streets for some days. The oil will not stain fabrics, and will therefore not soil the skirts of women. On account of the deleterious matter which finds its way into our streets, Commissioner Wickes's idea should aid materially in lessening the diseases which appear to be carried in street dust. While the oiling of thoroughfares in a city would cost considerable money, the taxpayers should be willing to pay for something that ought to lessen the present heavy work of the register of vital statistics.

Creo-Resinate Wood Pavement for New York

As a city, New York is awakening to the fact that it has much to learn regarding the important matter of street paving. For years the effete granite block system and the myth regarding asphalt as an ideal pavement have been dominating features in the paving of this great city. Latterly, however, a more intelligent method of dealing with the problem has come into vogue. Practical experiments of great value have been made, with the result that the city is shortly to have a considerable area paved with a wooden pavement that has already demonstrated its superiority over both asphalt and granite. Concerning this important matter Mr. George R. Olney, chief engineer of highways, said to a MUNICIPAL JOURNAL representative:

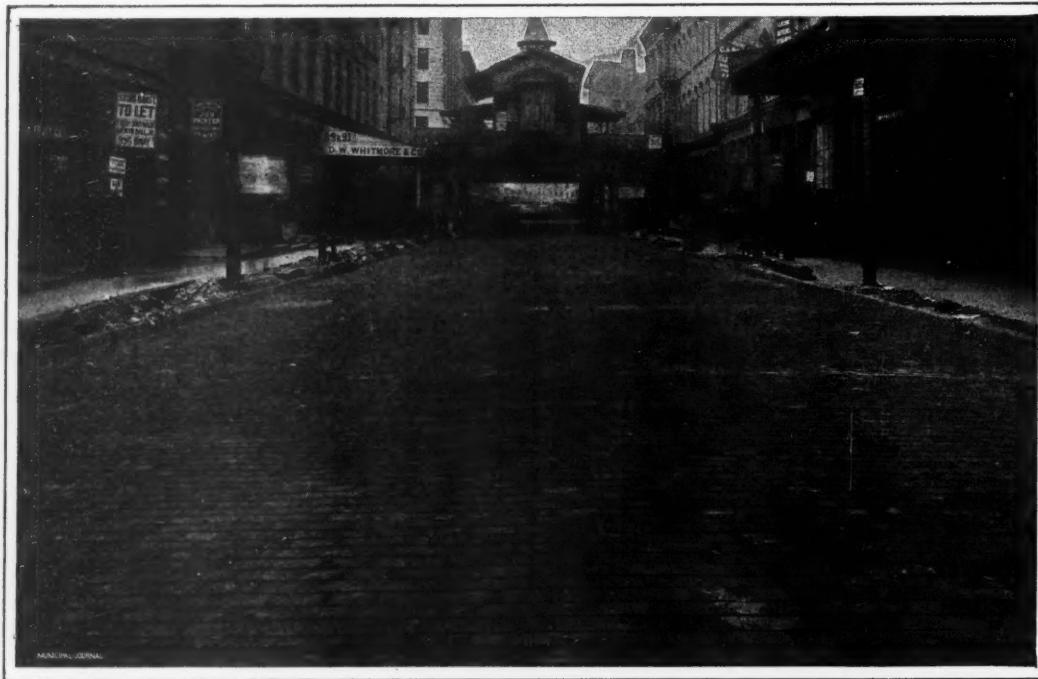
"Last fall we had the creo-resinate wood block pavement laid on Warren street, between West Broadway and Greenwich street, this being a peculiarly heavy test because of the heavy traffic that passes over it and also on account of the slight grade. This spring we continued this paving from Greenwich street to Broadway. Regarding this pavement, I may say that we insist on the wood being the best Florida

deep study of the paving question, is so much pleased with it that he wants to use more of it on down-town streets where the traffic is the heaviest.

"The business men of Warren street are not only pleased with the pavement, but many of those of West Broadway, including Acker, Merrall & Condit and Straus & Company, as well as the Truck Drivers' Association, have petitioned that West Broadway be paved with the creo-resinate block. The Warren street section of pavement was laid in order to test its quality under conditions of heavy traffic. For a test for light traffic, we have had this pavement laid in Ninety-eighth street between Central Park West and Amsterdam avenue.

"The pavement so far stands first-class. So high is our opinion of it that the Borough President has instructed me to prepare specifications for having it laid on Cortlandt and Murray streets, between Broadway and West street. Bids for this work will be advertised for at our next letting.

"With regard to the fact that lower Broadway, from Canal to Vesey street, is being repaved with granite block, I may say that the contract was let some time ago and before the successful tests were made with creo-resinate wood block. The merchants and business men of Broadway wanted asphalt, but the truck drivers were greatly opposed to asphalt on the streets bearing heavy traffic. The highest endorsement of the wood block pavement comes from the truck drivers."



CREO-RESINATE WOOD BLOCK, WARREN STREET, NEW YORK

pine. The wood block is treated with a solution composed of fifty per cent. creosote and fifty per cent. resin, with which the pores of the wood are thoroughly filled. I have the blocks placed on a concrete base and laid in mortar. The joints are filled with cement grout.

"The test has proven entirely satisfactory. Granite block is all right when first laid, but within a very short period grows to be slippery, a fault which the creo-resinate wood block does not have. After the severe test of last winter we found the section laid last fall in perfect condition, so far as wear was concerned, and not only so, but I heard from all sides, among the truck drivers, expressions of greatest satisfaction, and that it was much to be preferred to granite. President Ahern, of Manhattan Borough, who has made a

local lines, generally of narrow gauge and cheap construction. These several roads had 332 stations for passengers alone, and 7 stations for freight alone, making a total of 436 stations, or one station for each 2.37 miles.

The total number of men employed in all departments of the service, including those working in railway shops, was 21,904, or slightly more than 21 to each mile of line.

The State railway debt at the close of 1902 was approximately \$94,500,000.

While railway statistics of Baden in recent years show a rapid increase of both freight and passenger traffic, they also show a tendency for operating and other expenses to increase at a rate more rapid than the gross earnings of the

* From United States Consul Harris, Mannheim, Germany.

lines. The net earnings during the past two years have not reached a sum sufficient to properly provide for the railway indebtedness, and the crisis thus reached has led to much discussion as to the causes of and remedy for the situation. The subject has been very fully considered in the legislative bodies at Carlsruhe by the department of railway management and by the press of this locality.

Including the few unimportant private railway lines in Baden, the net earnings of which are a trifle higher than the State lines, the total net earnings on the capital invested in the railways of Baden for the years 1900, 1901, 1902 and 1903, is stated to have been 3.31, 2.55, 2.39, and 2.30 per cent., respectively.

In 1890 the operating expenses of the lines were 61.18 per cent. of the total income. In 1902 this percentage had risen to nearly 82 per cent., and while this rate was reduced to 72 per cent. in 1903, the net earnings for the year were regarded as considerably below the point of a safe fiscal showing. These earnings, which in 1899 had reached the highest point, almost \$6,000,000, had dropped in 1900 to \$4,285,000. In 1901, 1902, and 1903 the earnings were \$3,450,000, \$3,500,000, and \$3,284,000, respectively. The present estimated demand for interest and sinking fund is about \$6,000,000.

Among the causes most frequently assigned for the unfavorable situation are: The general business depression under which Germany has suffered for some time past, the improvement of the lines themselves, including the building of stations, etc., increase of wages paid employees, and losses due to accidents. Other causes less frequently assigned as tending to reduce railway earnings in Baden are the low passenger rate, due to the use of mileage books (kilometer Hefts); the want of better traffic agreements between the railway authorities of the several German States; the small freight cars, which it has been urged should be supplanted by the heavier cars of the American type, etc.

In 1895 the railways of Baden adopted a convenient form of mileage book for each of the three classes of passengers. These books are not in use on lines other than those of Baden, and have considerably reduced the price of travel on the State lines. Until 1901 these books were sold for 1,000 kilometers (621.36 miles) only. In the last-named year a book of 500 kilometers (310.68 miles) was sold to third-class passengers only. The rules for the use of these books being very liberal, more than 40 per cent. of the travel, other than through travel, is by means of them. The prices charged are as follows:

First class, 1,000 kilometers (621.36 miles), 60 marks (\$14.28), about 2.3 cents per mile.

Second class, 1,000 kilometers, 40 marks (\$.52), about 1.5 cents per mile.

Third class 1,000 kilometers, 25 marks (\$.19), and 500 kilometers (310.68 miles), 12.50 marks (\$.15), both running about 1 cent per mile.

The use of these books dispenses with the usual extra charges for express trains, and as 1 mark (23.8 cents) is refunded upon return of the cover of the 1,000-kilometer book when used, their effect is to considerably reduce the cost of travel. For example, by mileage book, the fare from Heidelberg to Basle, third class, by fast or slow train, is 6.30 marks

(\$1.50); by regular ticket, for slow train, 8.70 marks (\$2.07); for fast train, 11.55 marks (\$2.75).

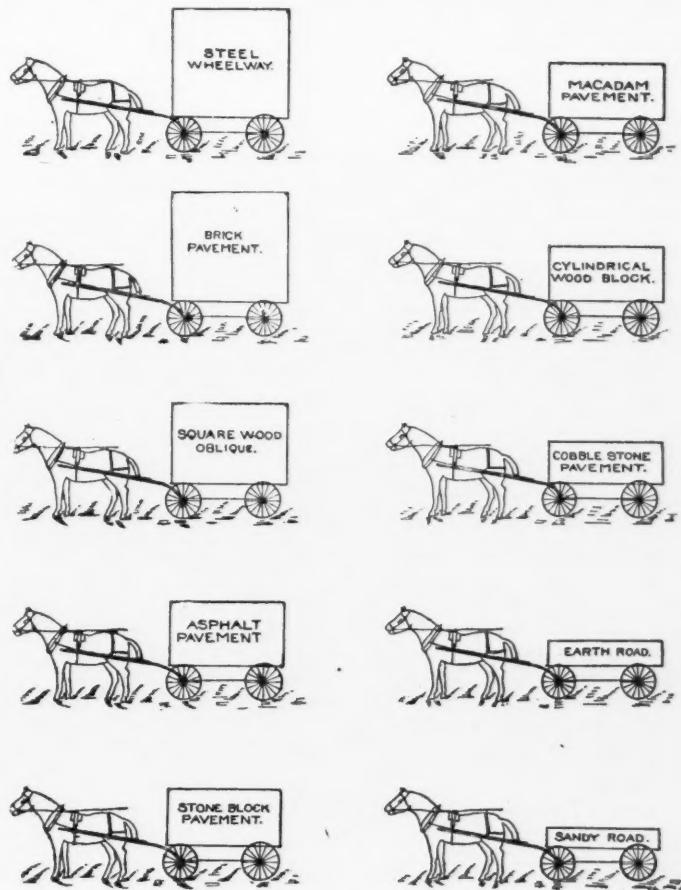
The sale of these books since their adoption has been as follows: 1895, 72,794; 1896, 87,082; 1897, 118,554; 1898, 138,273; 1899, 157,669; 1900, 173,796; 1901, 208,418; 1902, 246,779; 1903, 280,371.

Two 500-kilometer books counted as one 1,000-kilometer book in 1901, 1902, and 1903.

The respective number of these books which falls to each class of travel may be seen from the figures for 1902 and 1903.

Class.	1902	1903
First, 1,000 kilometers (621.36 miles).....	1,067	1,236
Second, 1,000 kilometers (621.36 miles).....	36,754	38,226
Third, 1,000 kilometers (621.36 miles).....	62,813	59,191
Third, 500 kilometers (310.68 miles).....	292,289	353,428

Differences of opinion exist as to the effect of the cheaper fare. The public naturally approve of it and further concessions are urged looking ultimately to still lower rates of



COMPARATIVE SIZE OF LOAD WHICH CAN BE DRAWN ON VARIOUS KINDS
OF ROAD SURFACES IN AVERAGE CONDITION WITH EQUAL
EXPENDITURE OF FORCE

Courtesy of John W. Alvord, C. E., Chicago

travel. The whole subject of cheap transportation facilities as related to industrial and social welfare has been made the subject of exhaustive newspaper articles and earnest official consideration. An extreme view of the question of these mileage books has been that they are the cause of the unfavorable situation; that passenger rates in Baden are by their use brought to a price that ceases to be profitable. A somewhat middle ground is that occupied by the State authorities and business men generally, that the present rates should be maintained, but that they are probably as low as is safe.

Cost of Cleaning Columbus Streets

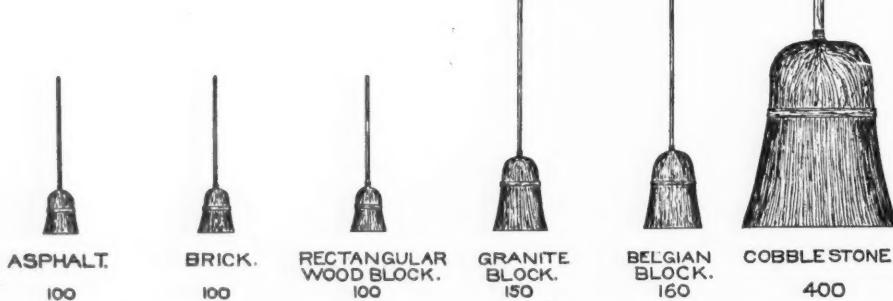
In the annual report of Sylvester Condon, superintendent of the street cleaning department, to the board of service, of Columbus, O., stress is laid upon the fact that inconsiderate business men and thoughtless pedestrians litter the streets with paper and refuse and cause the street cleaning department to be of less avail.

Building contractors likewise scatter sand and material at least a block distant from the point at which they are working.

Wagons improperly loaded scatter their contents along the streets and make it practically impossible for the department, exercising the utmost diligence, to keep the streets free from unsightly refuse. Supt. Condon recommends that litter boxes be placed at regular intervals along the streets.

Sprinkling he regards as a sanitary necessity, and reviews the results accomplished during the last year when

DIAGRAM REPRESENTING
THE COMPARATIVE LABOR NECESSARY TO EXPEND IN
CLEANING PAVEMENTS
AS DETERMINED BY COST OF CLEANING IN NEW YORK CITY.



a defect in the code did not permit of general sprinkling with collections from property owners except by petition.

One of the important recommendations contained in the report is the consolidation of the machine cleaning and hand patrol under the same department instead of having them separate as is now the case.

In summing up the work accomplished during his year's incumbency, Supt. Condon gives these figures: Machine cleaning, great squares, 101,879; cubic yards of dirt removed, 61,616; net cost per great square, 38.7 cents.

Hand patrol—Number of cans of dirt removed 96,708.

To do all this work of street cleaning the city expended during the year \$59,314.55. This amount is \$4,000 in excess of the previous year owing to the fact that there has been an increase in the number of teams and an advance in laborer's hire, and the machinery has been thoroughly overhauled and repaired during the year.

An inventory of the machinery shows that the machine cleaning department has equipment valued at \$10,204, while the hand patrol has paraphernalia listed at \$1,074.40.

Street Railways and Street Cleaning

THE department of street cleaning of Brooklyn has recently contracted with the Brooklyn Rapid Transit Co., through the American Railway Traffic Co., for the disposal of the city garbage, including ashes, street sweepings and paper by the establishment of more than a dozen collecting or receiving stations located at various points about the city. The city collecting wagons of the street cleaning department are saved about one-half of the haulage heretofore required by this arrangement, as at the present time they simply dump the rubbish into steel ash bins located in pits at the various receiving stations, and the railway company loads these bins upon their cars, and haul the same to the outskirts of Brooklyn, where they are dumped, the material being used for reclaiming lands under shallow bodies of water and for filling purposes. In each collecting or receiving station an electric overhead traveling train is provided,

which serves the five rows of ash bins, which are arranged four in each row. These steel ash bins are lifted from the pit by the electric crane, and placed upon special cars provided for the purpose, which are about 8 ft. wide and 38½ ft. long. These cars each hold four bins with a load of about 52,000 lbs., the bins holding about 10 cub. yds. each with an average weight of about ½ ton per cubic yard. The bins are provided with sheet steel covers, and each has two trunnions provided for the hooks of the crane and rings at the bottom of the bin for dumping purposes. These cranes have each a span of about 35 ft. and a total capacity of about 15,000 lbs., a third cable being utilized for catching the ring at the bottom of the steel bin when dumping. The cars are each equipped with four 40 h. p. motors of the Westing-

house type and air brakes of the Christensen type. When the cars have been hauled to the outskirts they are unloaded by means of a derrick car of eight tons capacity, Lidgerwood electric hoists being utilized on the rear of the derrick, which has a boom swinging through an arc of 170 deg., with a 30 ft. affective radius of action. These derricks are equipped with 50 h. p. general electric motors, and operate the crane at a speed sufficient to unload a bucket weighing from 12,000 to 16,000 lbs. in two minutes. In addition to the use of the derrick car for unloading a traveling aerial cable way has been provided for large fills. It is stated that by this method of disposing of the city ashes the street railway obtains an excellent revenue, and the city disposes of this material at a greatly reduced cost.

Macadam Roadway Specifications

THE following specifications for a macadam roadway have been prepared by an English engineer for a good roads' association, and will be of interest to MUNICIPAL JOURNAL readers for that reason:

EXCAVATION

The excavation shall be carried to the solid, and the formation shall be accurately shaped to a template cut to give a fall of $\frac{1}{2}$ inch to one foot in width, measured from the crown to the channel.

If it is needful to excavate any soft material below the general formation level, the holes so made shall be filled in with approved hard material, properly consolidated.

If it is needful to embank any portion of the roadway, the filling shall be of good dry material, rolled or punned and watered, and properly consolidated.

FOUNDATION

Upon the formation prepared as above a layer of hard core shall be spread, of such a depth that after consolidation by steam roller it shall stand full nine inches in thickness. Should there be any unevenness after rolling, the thickness shall be made up with approved small material.

The hard core shall consist of old brick rubbish, free from excessive dust and smalls (not more than 10 per cent. of smalls will be passed.)

The contractor may also use slag or large hard stone in place of brick rubbish; but in the event of his doing so, he will be bound by the above clause as to smalls.

ROAD SURFACE

Upon the surface of the foundation four inches of granite shall be laid, and dry rolled down to $3\frac{1}{2}$ inches. The stones for this intermediate layer shall be broken as nearly cubical as may be, and shall all pass through a 3-inch ring. Ten per cent. of $\frac{1}{2}$ -inch granite chippings shall be added after the stone has been dry rolled, and shall be swept into the interstices of the granite, and the whole re-rolled.

Upon the intermediate layer one coat of $1\frac{1}{2}$ -inch granite shall be placed and thoroughly dry rolled. No binding shall be added to this layer.

The finishing coat shall consist of accurately-broken cubical stone, carefully spread and regulated, so that the volume of interstice shall be reduced to a minimum. After thorough dry rolling, a sufficient quantity of $\frac{3}{8}$ -inch chippings and clean sharp granite sand shall be added, and swept into the voids. The whole shall then be watered and re-rolled until no further compression is possible with the roller. All surplus binding material shall then be swept off the road surface, and the whole left true to curvature throughout.

**The New Baltimore**

THE new Baltimore will be more beautiful than the old and the improvement in the new architecture over the old will be very marked as skeleton and slow burning construction succeeds the brick structure of earlier days.

In addition to the nearly 200 buildings in actual course of construction in the burned district, excavations and preliminary foundation work on all sides indicate the activity of reconstruction which has made itself so generally felt. Many of the lots in the central part of the district, and especially along Baltimore street and on the cross streets near that dividing thoroughfare, are now being cleaned and the old foundations removed preparatory to rebuilding.

Among architects and builders there is much of the spirit of progress, both in design and durability of construction, and the new Baltimore will mark a distinct era in building.

In the old days the owner of the property selected his builder and went ahead, with the main object of securing a roof and four walls for his shelter out of the ordinary brick construction, which was the only style then recognized in the laws. It is different now. There are four styles of construction, enumerated by Building Inspector Preston as the ordinary brick and stone construction, skeleton, concrete and mill construction. The first is the old and, before the fire, prevailing style.

The skeleton construction was not known in Baltimore until the advent of the Equitable, Union Trust, Calvert, Continental Trust and other similar structures.

The present laws recognize all of the modern methods of construction and a height of 175 feet, or about 14 stories. In the rebuilding of the burned district advantage is taken of the improved methods of construction. The skeleton, which consists of a steel framework, carrying the entire load of the building, the walls of which are merely curtains or partitions, is much in evidence. The concrete structure is also conspicuous, being a solid mass of iron, steel and concrete. The mill, or slow-burning construction, is limited to 85 feet in height. A building of this character has brick walls, wooden columns and floors, with heavy wooden beams three to four inches apart and three inches of flooring. According to Mr. Preston, it has been the experience of fire-fighters and builders that slow burning construction is even better than iron beams and cast-iron columns, the wooden beams charring slowly, while the iron is apt to collapse with the heat.

In the rebuilding of Baltimore the architects and builders have the advantage of what has been learned from years of experimenting and testing. All material that goes into a building in this modern day has been thoroughly tested as to its resistance, weight-carrying power and relative strength, and a building is now put up on paper by the closest kind of computation.

Architects seem to appreciate the desirability of having as much light as possible, and the old style of small windows and large blank piers has given way to the large double or triple windows, with only small iron or stone muntins. The old-fashioned wooden cornice has also been replaced by highly ornamental designs in metal, adding attractiveness to the general design. Buff and gray seem to be the most prevalent shades used in front brick work, laid in what is known as Flemish bond, with sunk joists. This is a reversion to the colonial style, and, when combined with terra cotta trimmings to match, with the colonial parapet and balustrade, makes both an imposing and durable structure. This style of architecture has almost entirely supplanted the fine cut press brick work of 50 years ago.

Improvement of Streets in Leavenworth

MAYOR D. R. ANTHONY, JR., of Leavenworth, Kan., in his report of 1903, gives some interesting items regarding the streets of that city. The practical benefits from an intelligent conduct of the affairs of the Department of Streets and the application of the business principle of requiring a dollar's worth of work for every dollar expended in the department is apparent to the citizens of Leavenworth in the improved conditions of their streets. The department is no

longer a pension bureau for the aged and infirm political adherents of city administrations.

During the previous fiscal year of 1902-1903 the sum total of \$21,011.34 was expended in the Street Department. During the fiscal year of 1903-1904 the total amount expended by the department was \$17,658.19, and the results accomplished have been fully three-fold as compared with the former year.

In the matter of sweeping and cleaning the paved streets a decided economy has been effected. During the year previous it cost the city \$6,941.10 to sweep and clean 99 blocks of paved streets. During the year just passed there were constructed 47 additional blocks of street paving, making the sum total of 146 blocks of pavement now to be swept, and this greatly increased area was swept more frequently and thoroughly at a cost of but \$6,339.36 for the year just closed.

A new sweeping machine and road grader has been purchased at a cost of about \$500. An improved street sprinkler cost \$350. The streets are sprinkled before being swept. A vacant lot was purchased for the use of the Street Department—for storage and tool house—at a cost of \$500. During the past year the city has opened the gutters and graded and rounded up a total of 208 city blocks. The Mayor looks for a continuance of the good work of the Street Department.



The Progress of Council Bluffs

IN 1891-1892 Mr. Donald Macrae was Mayor of Council Bluffs, Iowa. In 1904 he was again elected Mayor of the city, and the official statistics of the municipality during the interval between the terms makes an interesting record of the progress of the city and the relative cost of governing it.

In 1892 the total current expenses of the city were \$121,512.52, the salaries of executive officers \$13,154.69. In 1903 the total current expenses were \$59,416.19 and the salaries of executive officers \$10,350. The total city debt in 1892 was \$931,793.19 and in 1903 it was \$368,080.39. The outgoing Mayor, Mr. Dell G. Morgan, congratulates the city on the fact that with no floating debt and all warrants paid on presentation an excellent showing is made. With this record maintained for a few years it will not be long until the city will be in a splendid financial condition, when the people can be relieved of some portion of the burden of taxation.



Financial Soundness of Fort Wayne

IN his report to the Mayor and Common Council of Fort Wayne, Ind., for the fiscal year ending Dec. 31, 1903, City Comptroller Joseph V. Fox congratulates the city on its strong financial condition, which he attributes to the fact that all the officers and employees are zealous in managing the city's affairs in the most economical manner. The Comptroller finds that the general balance remains practically the same, although the expenditures exceeded those of 1902 by more than \$20,000, while the tax levy remained the same. Almost \$28,000 were granted to the different departments, for which no allowance was made in fixing the tax levy. The

Comptroller suggests that the departments in future anticipate their needs in time to be included in the annual appropriations at the time the tax levy is made. The reason why the general balance was not impaired lay in the great increase in the property valuation and the comparatively small amount of delinquents during the year. Mr. Fox suggests the investment of the special funds in hand [\$55,793.62] where they will bring returns. The city has already \$27,290.51 invested in improvement bonds for electric light plant fund, which is bringing 5 per cent. interest.

The city has total assets amounting to \$2,946,067.83, and total liabilities consisting of bonded debt of city, bonded debt of school property and water works department to sinking fund, of \$758,600, leaving net assets of \$2,187,467.83.



Civics at the Table

W. D. NESBIT.

"Every dinner table in Chicago should be a school of civics and municipal government."—Alderman Alling.

We were gathered at the table, and the cook had served the soup,

When my sister said the voter was a weak, unknowing dupe; Then my father looked astonished, and he hammered with his hand

While asserting that the voter was the bulwark of the land, But my brother interrupted and sarcastically laughed

While he read a dozen chapters of "The Inner Truth on Graft."

Then my mother raised her eyebrows and invited us to hear Mrs. Buzzy's splendid words on "Is the Ballot Woman's Sphere?"

And she read them to the finish, supplementing them with notes

She had taken on a lecture on "The Dickering in Votes."

Then my sister answered mother: "It's a noble message. Yes,

But do you remember, mother, Mrs. Buzzy's purple dress?"

Mother never even noticed what my sister said to her; She was reading from "Elections--As They Are and as They Were";

Then she turned to socialistic arguments and made it clear That the bickering for office was indeed a thing to fear; And she said the hand of woman from the tree should pluck the fruit

Of the governmental harvest—and my sister said, "How cute!"

Mother went from that to Darwin and to Spencer and to Kant,

Showing that the straightest voter had a little bit of slant— But there came a sudden ending of her oratory deep, For we chanced to look at father; he was sitting sound asleep.

And the soup was cold and cheerless, for we hadn't tasted it; Then the cook came in and stated: "Since you never eat, I'll quit!"—*Chicago Tribune*.

NEWS AND PRACTICE AMONG THE CITIES

Water Works and Sewers for Mexico—Rates on Public Utilities—Electrolytic Action on Water Mains—Cost of Lighting in Chicago

Water Works and Sewers for Mexico

THE State of Nuevo Leon has let a contract to an American company, represented by Col. J. A. Robertson, of Monterey, for a modern, fully equipped system of water works and sewerage for the city of Monterey. The whole expense is to be borne by the American company, the State guaranteeing to that company a certain rate of interest on the investment. At the end of a number of years the city of Monterey has the option of purchasing the water and sewerage system for the city.



Rates on Public Utilities

AMONG the last of the important measures adopted by the city of Houston, Tex., during the past year was the passage of several ordinances fixing the rates for public utilities, such as street railway fares, gas, electric light and telephone rates, hack and dray charges, etc. This was the result of the efficient work of a special committee of the Council. While this committee did not materially reduce the charges of public utilities, except to cut the price charged for gas from \$1.80 to \$1.50, they accomplished a great deal by placing the rates in such form by enacting them into ordinances in such a way as to prevent their being altered or changed except through the action of the Council. Another benefit accomplished is that the schedule of rates is made so clear that the public will have no difficulty in interpreting them and will know exactly what they have to pay.



New Board of Health Plan

ACTING under instructions from the Board of Health of Kansas City, Dr. J. M. Langsdale, the city physician, has directed the forming of an organization of thirteen physicians to be known as the Board of Inspection. The principal duty of this board will be to conduct a practical inspection of all schools, stores and factories of the city, with a view of finding all cases of contagious and infectious diseases, removing those afflicted and prescribing proper treatment for them. Besides the inspection the work of the board will include a winter course of lectures by the different members and other physicians to the teachers in the public schools. These lectures will be devoted to subjects which will tend to give the teachers sufficient instruction to enable them to help the board in its work of inspection.



Special Water Mains for San Francisco

SAN FRANCISCO, CAL., has been seriously considering the installation of an auxiliary high pressure, salt water system for fire protection, and plans have been prepared and submitted to the Board of Public Works by City Engineer C. E. Grunsky, recently appointed Isthmian Canal Commissioner by the President. Acting on the idea that the quantity of water actually used in fire fighting is much less than is generally supposed, Mr. Grunsky stated that there was no good reason for supposing that, because salt water could

be had without cost, it would be cheaper to use it than fresh water and he declared it would not be any better. The City Engineer's ideas were not coincided in by several members of the Board of Fire Commissioners.

With the assistance of Mr. J. C. H. Stut, consulting engineer, Mr. Grunsky devised a system which would deliver as much water as twenty of the city's ordinary steam fire engines, or about 10,000 gallons a minute, in the business district at a pressure of 200 pounds. The plan included water storage in a reservoir elevated 755 feet on the slopes of Twin Peaks. Fresh water would be pumped from the mains of the Water Company. Should the plant make use of direct service pumps, they would be located so as to take water from one of the long piers at 9,600 gallons a minute. The system would cost \$642,770 divided as follows: Pumps, \$158,870; reservoir, \$80,000; 22,250 feet of pipe, \$205,445; engine house at pressure relief tank, \$25,000; real estate, \$55,000.

Electrolytic Action on Mains

THE attention of the New Bedford Water Board, R. C. P. Coggesshall, superintendent, was called early in the year to the damaged condition of the large steel force main located within the limits of the Middleboro road and parallel to the tracks of the Old Colony Street Railroad for a considerable distance. The damage was due to electrolytic action. At a point where the main passes beneath Whitestone Brook, sections were found to be completely destroyed. An examination of the entire distributing piping was made by an expert, Mr. A. A. Knudson, E. E. Several lengths of 6-inch removed from the river bed were found by Mr. Knudson to be badly softened by electrolysis at the spigot end, where nails could be driven in the soft material. Mr. Knudson reported that a conference with the railway officials showed evidence of good intention on the part of the railway company and suggested the awaiting the results of the attempt to better control their currents and keep them off the main. He further suggested that after the proposed improvements have been completed that further tests be made so that a comparison may be had with those tabulated and such changes for the better, if any, noted.

Fortunately the discovery was made in season to prevent the corrosion from progressing to a more serious stage.



The Garbage Crematory of Portland, Oregon

FROM the annual message of Mayor George H. Williams, of Portland, Ore., it appears that during the past year there have been 28,138 cubic yards of garbage cremated, 251 horses, 38 cows, 742 dogs and 62 other animals; 8,744 hours were employed in operating the crematory; 480 cords of slab wood and 1,094 loads of sawdust consumed. The cost of operating the crematory during the years 1903 was \$7,676.80. It was expended as follows: Labor, \$3,326.60; fuel, \$3,206.75; repairs, \$748.20; miscellaneous, \$394.95.

The volume of garbage cremated during the year was

greatly in excess of the amount in any previous year. Extensive repairs were made to the furnaces, and the plant has been operated in a very satisfactory manner. No complaints have been received. The garbage crematory is under the control of the Board of Health, and has received the particular supervision of Dr. W. H. Saylor. There are employed at the crematory five men, a superintendent at \$75 per month; three laborers at \$60 per month each and one laborer at \$50 per month. It is very probable that the capacity of the crematory will have to be doubled during the next year, and this can be done by adding two more furnaces, which it is estimated will cost \$6,000.

Permanent Improvements in Houston

MAYOR O. T. Holt, of Houston, Tex., is justly proud of the important work accomplished in his city in the year 1903. He directs particular attention to the fact that the bulk of this work has been paid for out of the general fund after paying all the current expenses of the city, such as police, firemen, street, garbage and park expenses and the salaries of all departments, and without the necessity of issuing bonds, except to the amount of \$100,000, issued for the completion of the Market House Central Fire Station and for the betterment of schools. A large amount of the permanent street improvements and sewer work completed during the year had to be paid out of the general fund, as on Jan. 1, 1902, there was but a balance of \$21,189.84 left in the paving fund and \$9,024 in the sewer fund.

Of this character of work there has been completed during the year improvements in streets, bridges, sewers, a scavenger disposal house, a pump, improvements in City Park, fire engine houses, the Carnegie library and City Hall, making a total expenditure of \$148,602.74, a portion of which was paid out of the general revenues of the city. Two of the important improvements have been the handsome Market House and City Hall, constructed at a total cost, to date, of \$99,997.29. The building has been insured for \$75,000. The other improvement referred to is the Central Fire Station, to cost \$30,000, which, when completed, will provide the city with a completely arranged fire headquarters.

Cost of City Lighting in Chicago

It costs Chicago \$29 a year for every horse-power generated by steam for running its electric lights, while if the city should obtain at cost the power to be manufactured from the canal by the \$3,000,000 plant now being built at Lockport by the Sanitary Board the expense to the city each horse-power would be \$10.25. The city electrician could then flood the streets of Chicago with light like that of 40,000,000 candles at no greater expense than it pays for the 11,800,000 candle-power which now illuminates this city.

These facts and figures have been prepared by City Electrician Ellicott in answer to a request from Chairman Bennett, of the city council's Finance Committee, and are to be submitted to President Carter of the Sanitary Board. They will form the basis of the arguments by which the city officials hope to secure at cost from the sanitary trustees the use of the power to be generated from the canal.

"We owe it to the city and to the sanitary board to treat this matter fairly," said Mr. Ellicott. "Three engineers

have figured upon the anticipated cost of this power, and they agree that it will approximate \$10.25 a horse power. That estimate includes the generation of the power, the expense of bringing it to Chicago, the depreciation, the maintenance and 4 per cent. interest on the investment.

"We are now using in the streets 5,080 arc lights, which we operate ourselves at an annual cost of \$54.50 a light. We also rent 674 arc lights for which we pay \$103 a year apiece. Of the annual outlay of \$54.50 that the city is under for every arc light it maintains itself, \$29 represents the cost of generating that light by steam, while \$25.50 is the electrical expense. The latter expense would remain the same anyway, but the \$29 is the item which by the use of the power from the sanitary canal at cost we could reduce to \$10.25. The 5,754 arc lights now in the streets of Chicago could be increased to 16,000 if we had the sanitary canal power at cost."

Pumpage and Water Consumption in Lowell

IN submitting the report of the Lowell (Mass.) Water Board for 1903, Superintendent Robert J. Thomas points out that notwithstanding that the expense of pumping as per the City Engineer's report shows a large increase per million gallons, the annual consumption of water decreased 168,813.355 gallons, and the saving in coal over the previous year was 238 tons. The increase in the cost of pumping was due to the enhanced price of coal, which cost \$25,000 more than it did in 1902. The department did well to show a balance on the right side without allowing its interests to suffer. The construction work was considerably less than in former years, nor was the amount of supplies purchased, other than coal, nearly so great.

The daily consumption of water was only 5,256,823 gallons—the lowest since 1889. This naturally effected a reduction in the charges and receipts for water to some extent, which benefited the water takers as well as the department. The total equivalent of coal consumed for the year was 8,481,804 lbs.; total pumpage, 1,923,370,860 gallons; number of gallons pumped per pound of equivalent coal, 227; cost of pumping, figured on pumping station expenses, \$.46.218.06.

London Street Accidents

ARISING out of a question asked in Parliament by Mr. J. S. Montagu, the Home Office has just published a table showing the number of street accidents which occurred to the knowledge of the Metropolitan Police within the Metropolitan Police District during the year ended May 31, 1904. It is not practicable to give similar figures for other centers, and this is much to be regretted, as the comparisons would be very interesting. An added column of percentages is most instructive in showing that horse-drawn vehicles cause more than 90 per cent. of the street accidents.

The total number of accidents to persons or property was 24,375; accidents to property, 17,805; to persons, 8,241; total number of persons injured in accidents, 8,561. The nature of the accidents enumerated was as follows: Slight, 7,364; serious, 982; fatal, 215. The percentage of the total accidents shows the following ratio of causes: Motor cars, 6.7; motor cycles, .7; horses, 1.8; horse-drawn vehicles, 90.8.

MODERN IMPROVEMENTS IN FIRE SERVICE

THE evolution of improved systems of fire fighting must in the nature of things continue according to the necessities which have in the past, and must in the future, give rise to

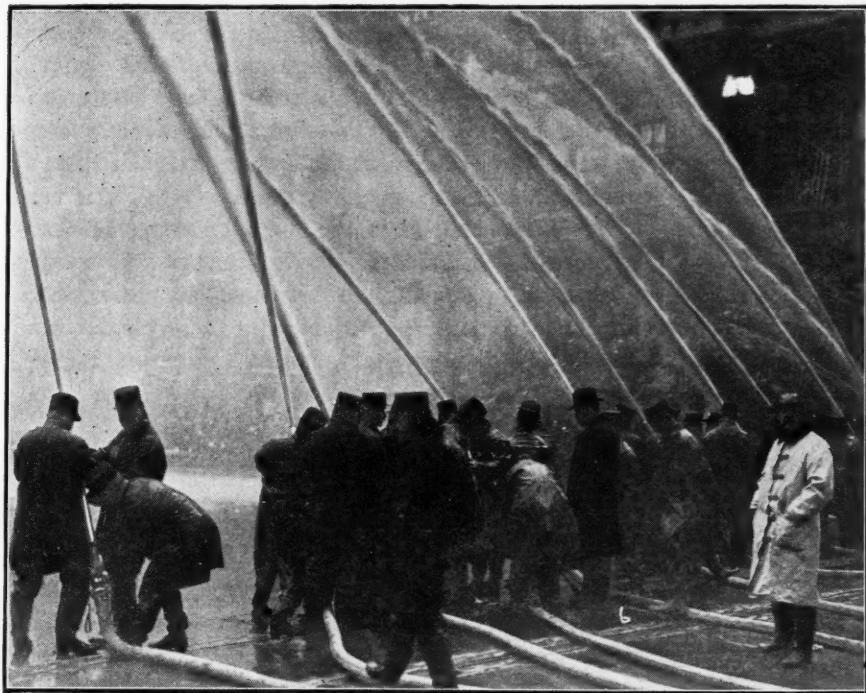
development has been well and good, but in spite of it fire losses have been constantly on the increase.

The improvement in the fire service has been growing at but one end. Its whole progress has been cut short at the outer or nozzle end. Good time is made in reaching the fires, ladders quickly raised, as brave firemen as earth contains are at hand to do and dare, but in the face of a big fire which has gained unusual headway, all these things prove weak in their counter-acting power. There must be a growth at the other end of fire department improvements, namely, the stream end. It is probably true that fully ninety per cent. of all the fire companies in this country stop in their equipment in sizes of streams that are no larger than 1 inch, $1\frac{1}{8}$ or $1\frac{1}{4}$ inches; the same sizes were formerly used on hand engines.

Before the fire losses can be materially decreased or fire insurance companies expected to lighten the burden of property owners, the indisputable principal, that streams must be in proportion to the fire has got to be recognized and adopted. Small streams add fuel to big fires. Before an extraordinary blaze can be placed under control, the temperature

must be reduced, a thing which all ordinary streams in the past failed to accomplish.

The streams have not been on account of an inadequate water supply, or lack of pressure to carry vastly greater



HIGH PRESSURE TEST, PHILADELPHIA.

such evolution. The improvement in the methods of putting out fires cannot come to an abrupt stop. It must continue until the habitations of man become fireproof in fact as well in name. The era of increasing fire losses show that radical changes are necessary in the equipment of fire departments. Marvelous as have been the strides made in the development of fire fighting appliances in the past, much remains to be done to bring the quenching of conflagrations properly up to date. Every community has an abundant supply of material to create conflagrations under unfavorable conditions, and neither the burdened insurance taxpayers nor fire insurance companies can much longer stand the results of our great fire losses over which the present day art of fire fighting seems to have no mastery.

Due credit should be accorded each new appliance which has in the past aided in the evolution of fire fighting efficiency. The hand engine has given way to the steam fire engine. The fire alarm telegraph system has been evolved, hanging harnesses, the invaluable chemical engine, and a score of other forms of acknowledged improvements have been introduced. It has been, apparently, an uppermost thought with fire experts to constantly inaugurate some change which would lower the record time of reaching a fire. All this



THE EASTMAN "JUMBO DELUGE SET" THROWING A THREE-INCH STREAM AGAINST A VERY HEAVY CROSS WIND 325 FEET, AT THE TEST OF THE NEW HIGH SERVICE SYSTEM IN PHILADELPHIA, APRIL 19, 1904

streams into the devastating flames, for present day village water works provide gallons of water where formerly but drops could be produced. The firemen are thoroughly handicapped with inadequate streams at large fires.

The apparatus which fire companies need in order that superior streams can be utilized whenever emergencies demand them, has already been invented and fire department managers should wake up to the fact and demand this new system. It will crown with greater efficiency all the other splendid improvements which tend to make effective every branch of the service up to its most vital point, which is the stream of water. This is the end which now needs to grow, and the most eminent fire experts in the country are recognizing it by introducing the Eastman new nozzle system, which produces superior streams in over thirty different sizes, from the smallest up to a three inch stream in diameter, all working successfully very long distances from ordinary pressures.

The system has passed the experimental stage and is proving valuable wherever used. Chemicals and small streams cope successfully with incipient fires, but as soon as the temperature becomes too high for the sizes of the streams in use, then larger streams and the means for handling must be at hand.

The causes for high insurance rates are almost wholly traceable to great fire losses, and high rates must inevitably be maintained to cover this emergency risk that has been left unprovided for, and the increasing fire losses can never be averted with ordinary streams of water.

The use of ordinary fire streams has brought many fire insurance companies to the verge of bankruptcy, and as a result rates must be advanced. A tablespoonful of water will not put out a kitchen fire, neither will a few ordinary streams perceptibly affect the roaring furnace within a burning building. When this principal is wrought out in the fire service, insurance rates will slump, as has already been the case in many cities, and which has been the means of stopping a raise in others where it has been fully adopted. It is a move in the right direction in true economy for all cities and towns. The demonstrations made by the projectors of the Eastman system seem to indicate that the present solution of the problem lies in the adoption of that system.

A New Fire Extinguisher

U. S. CONSUL-GENERAL COLE, located at Dresden, Ger., recently reported an exhibition of a new fire extinguishing material which he witnessed, as follows:

"In view of the feeling dominant in the United States since the disaster at Chicago, a description of the test of a fire extinguisher I witnessed yesterday may be interesting.

"The exhibition took place at the Sportplatz, in this city, and was attended by the director of the Royal Opera House and Theater, the chief of the fire department, the military commander, and by a number of manufacturers and others interested.

"The inventor, Max Eberhardt, of Munich, states that the powder used with the water to make the solution costs about five cents per pound and can be readily obtained anywhere, but the ingredients are his secret. When prepared, the solution presents a chalky appearance, but the inventor states that

it will not stain or otherwise damage woolen or cotton material, which, while wet with it, will not burn.

"In the first test the inventor saturated some strips of bagging with petroleum, applied a match, and when the material was blazing dipped his hands into a bucket full of the solution and slowly rolled the material into a ball, putting the fire out with no pain or inconvenience. This was done several times and, finally, by one of the onlookers with the same result.

"The next test was made in a vat about five feet long and three feet wide, which was filled with coal tar, over which petroleum was poured. When this was ignited great volumes of smoke and flame went up, and the fire was so hot the bystanders were compelled to retreat. While the fire was most furious one bucket of the solution was dashed over it and not a vestige of flame or fire remained.

"The final test was made with a pile of logs, somewhat resembling railway ties, which were built in layers of two, each to the height of twelve feet, and in the openings loose straw was stuffed, and then two buckets of petroleum were poured over the whole.

"A stiff breeze was blowing and when this material was ignited a fierce fire was in progress, which was allowed to burn for five minutes. A hand pump with a hose attached was near by, and when destruction of the pile seemed certain the inventor sprayed it with the solution, extinguishing the fire in about thirty seconds. I afterwards examined the logs, which were much charred, showing they had been thoroughly ignited.

"I realize that this statement may appear somewhat extravagant, but I have only related the facts as I saw them."



The Aerial Truck and the Insurance Rate

ALL doubt about the value of the aerial truck as a reducer of insurance rates has been set at rest by Mayor Eugene Beach, of Gloversville, N. Y. He says:

"Many prominent citizens of good business judgment consider the aerial truck an unnecessary and foolish investment, and believe the apparatus of the Fire Department previous to its purchase was sufficient for the protection of the city against fire.

"An argument urged in favor of its purchase was that the Underwriters' Association had recommended several additions to the means of safeguarding the city, promising that compliance with such recommendations would prevent material advance in insurance rates. Among these recommendations was the erection of additional fire stations in other parts of the city. When, however, it was found that insurance rates instead of being reduced had been materially increased there was considerable feeling of bitterness and disappointment.

"There has been some misunderstanding in the public mind regarding the cost of maintaining the truck. The public may feel more reconciled to the situation when informed that the cost of maintenance of the truck involves beside the interest on the investment only the expenditure incident to the owning and keeping of one extra horse, and when it is informed that the insurance rate has finally been very considerably reduced largely as a result of the efforts of the local agents."

Fire Fighting at Manchester, England

"Manchester is spending about \$425,000 and some two and a half years on the construction of what is called a new city fire station, but which is really much more than this," says *The Municipal Journal* of London, England.

"As will be seen by our illustration, it is no ordinary fire building that is being erected, but is to be really a handsome and imposing structure, giving provision, besides its main purpose, for a branch police station, court rooms for the city coroner and premises for the use of the staff of the gas meter testing office. It was originally intended to put up a much smaller structure, but on considering largely the city's needs it felt that the accommodation in the district for the holding of inquests was very inadequate, and that there was great need for more space for the extensive and rapidly increasing work of the meter-testing office, and after careful consideration a Fire Brigade Sub-Committee of the corporation agreed to include these two useful departments of public service.

"The next question to decide was as to the style and arrangement of this new block. It was decided to do the thing properly, and an exhaustive inspection was made of the latest and best examples of similar buildings, both in London and the provinces, and advantage was taken of the experience and assistance of representative fire superintendents. The present growing interest in machinery for fire prevention and fire fighting has also doubtless had its effect upon the minds of the movers in the matter.

"The site of the new building is a good one. The premises, rising to a height of three stories, will be ranged along four thoroughfares, a large enclosed space being reserved to the firemen for drilling purposes. There will be an engine house for seven engines, adequate stabling for the horses, residential quarters for officers and men, a recreation room and a tower 90 feet high for the drying of hose pipes. In the preparation of the designs the architects have aimed at directness and simplicity. The suites of rooms are carefully grouped in connection with the several departments, priority of position and aspect being given to the more important ones. With regard to the structure itself, the material selected for use is tawny terra cotta, faced generally with red plastic Accrington brick. The heating and ventilation arrangements are to form a special feature of the building.

"The City Council is to be congratulated on facing this ever-growingly important matter of fire extinction in so thorough a manner. Money so spent if not money saved is money well spent."

A Western Police Pay Roll

As an object lesson regarding the payment of policemen the following report of the pay roll of the Police Depart-

ment of Bay City, Mich., is not without interest. It is for the half-month ending May 31, 1904:

N. N. Murphy, chief of police	\$50.00
Matthew Ryan, captain	44.44
John Kennedy, sergeant	35.55
Geo. A. Hemstreet, sergeant	34.44
Geo. A. Craig, special officer	39.99
Tony Ripsky, truant officer	34.44
John Mulholland, sanitary officer	34.44
T. E. Hatch, court officer, sergeant	34.44
Maggie Cadmus, police matron	12.50
Wm. E. Toles, patrolman	32.00
S. M. Catlin, patrolman	32.00
Jacob Sadon, patrolman	30.00
Geo. A. Traub, patrolman	30.00
Joseph Radcliffe, patrolman	32.00
J. P. Warfield, patrolman	32.00
Hiram Hawkins, patrolman	32.00



CHIEF FIRE STATION, MANCHESTER, ENG.

Robt. Wallace, patrolman	32.00
Chas. Markel, patrolman	32.00
C. Wackerley, patrolman	32.00
Herman F. Smith, patrolman	32.00
Wm. Fitzgerald, patrolman	32.00
Joseph Meeks, patrolman	32.00
Abraham Newman, patrolman	30.00
Herman Passow, patrolman	30.00
Robt. Atkinson, special	32.00
Orval Deziley, patrolman	30.00
John Zimmerman, patrolman	30.00
Alsa Fox, patrolman	32.00
Gilbert Roseboom, patrolman	32.00
Fred. J. Puotell, patrolman	4.00
Total	\$952.24

This makes the annual pay roll for Bay City less than \$23,000.

WHAT POLICE AND FIREMEN ARE DOING

Doomed All Cats to Death

AROUSED by the biting of a woman of 60 years and a boy of 10 by a mad cat, the Town Council of Felton, Del., has issued an edict that all cats in the community shall be killed and that all dogs shall be muzzled. This is the first time that the quaint old town of Felton has ever been stirred to such an action.

Identification by Finger Prints

A MISSIONARY from China stated in a lecture to the members of the Anthropological Society, recently, that identification by finger-prints is no novelty. The practice had existed in Korea for many centuries. He had seen deeds dated 1,200 years ago in which it was employed. Slaves who were being sold were made to place their hands upon a sheet of paper, and the outline of the fingers and thumb was traced, after which an impression of each of the fingers was taken.

Increased Salaries for Sacramento Firemen

An ordinance was passed at Sacramento, Cal., recently, by unanimous vote, increasing the salaries of the employees of the Fire Department to the following amounts: Chief engineer, \$2,100; assistant chief engineer, \$1,500; engineer, \$1,440; drivers, \$1,080; foremen of fire companies, \$480; assistant foremen, \$420; hosemen, \$360; tillermen, \$1,080; engineer of the chemical engine, \$1,200; pipeman of chemical engine, \$1,080.

The salaries of the firemen at the Water Works were increased to \$90 per month.

Milwaukee's Fire Department

THE report for 1903 of Chief Herman Meminger, of the Milwaukee Fire Department, refers touchingly to the tragic death of the gallant firemen in February. It states that there were 1,756 alarms during the year, and the total fire loss was \$1,037,448. After demonstrating that Milwaukee has the most powerful and efficient fireboat in the country, the Chief recommends that a new fireboat be built for use in the upper river. In view of the necessity he suggests that two aerial trucks be purchased, several new engine houses erected and that the pipe lines be extended in various sections of the city.

Personals

—The people of Hoboken, N. J., are much pleased with the successful efforts of Chief of Police Hayes to greatly improve his department.

—Fire Chief Coots, of Indianapolis, expresses great satisfaction at the repairs to conduits in that city, bringing the water pressure up to the normal.

—Capt. E. P. Hulce, who was chosen to succeed Major Howard as Chief-of-Police, of Richmond, Va., by the Police Commissioners, began his term on July 1st. It will expire in six months.

—The city council of Cleveland, O., by the decisive majority of twenty-four to seven voted down a resolution to investigate charges of improper conduct which have been made against Chief of Police Fred Kohler.

—Fire Chief Harry Myers, of Spokane, Wash.; says that the water supply in that city is insufficient. In conjunction with Assistant Chief William Joyce, he made a gallant but useless attempt to save a burning sanitarium in his city.

—The fire department order recently passed in North Adams, Mass., increasing the salary of Chief W. W. Byers, from \$900 to \$1,200 a year and providing for the establishment of paid suburban companies was passed by a vote of 16 to 1.

—Chief of Police John J. Mason, of Memphis, Tenn., was the storm center during the recent political disturbances in the southern city. Rumors of his resignation continually arose only to be combatted a few hours later. The mayor favored the retention of the chief in office.

—The experiment of attaching two fire engines to one hydrant was recently tried by Fire Chief Little, of Rochester, N. Y., and officials of the fire department in an endeavor to obtain better water pressure for use in fighting fires, successful tests of which have been made within the last few weeks by the New York fire department.

—Mr. George H. Moore, one of the most prominent fire insurance men in the West, recently commented on the evident purpose of Fire Chief, Bywater, of Salt Lake City, to divorce the department from politics, and expressed the opinion that it could not fail to receive the hearty endorsement of the public as to be efficient a fire department must be run on business principles.

—Chief of Police Millikin, of Cincinnati, is so pleased with the results of the first target practice of the artillery division of the Police Department, which took place recently, that he has about decided to take the gun squad into camp soon for a few days and have continuous drill and target practice. The work was under the direct supervision of Chief Millikin and Inspectors Casey and Carroll.

—There is strong likelihood that the police department, of Springfield, Mass., will in the near future adopt a new system to supplement its present one in the identification of criminals. This system is no more nor less than the taking of impressions made by the inky thumb of the person whom it is wished to identify. Marshal George M. Stebbins is greatly impressed with the possibilities of this scheme and will advocate its adoption should any opportunity present itself.

—One of the quiet parts of the proceedings of the convention of Chiefs of Police and City Marshals of Texas, was the election of officers. For each office only one name was put in nomination. The following officers were elected: W. M. Rea of Fort Worth, president; W. E. Casey, of Texarkana, Ark., first vice-president; Epps G. Knight of Dallas, second vice-president; John R. Brown of Weatherford, third vice-president; M. T. Forrest of Houston, secretary-treasurer; Fred Long of Itasca, sergeant-at-arms; Arthur Forrest of Houston, mascot; Dallas-Galveston News, official organ. President Rea named as the executive committee, John T. Dollins, of Waco; J. F. Penn, of Dallas and Hugh Smith, of Temple.

LITERATURE ON MUNICIPAL TOPICS*

Reviews of Some Important Books—What the Magazines and Reviews Have to Say About Civic Affairs—Municipal Reports Received

Earthwork at the Washington Filtration Works, by E. D. Hardy. *Engineering Record*, New York, April 16, 1904.

The Value of Tests for Bacteria of Specific Types as an Index of Pollution, by H. W. Clark and Stephen De M. Gage. *Annual report of State Board of Health of Massachusetts for 1902*.

Notes on the Construction of a Storage Reservoir, by W. H. Richards. *Journal of New England Water Works Association*, March, 1904.

Requisite Amount of Water for a Public Supply, by J. H. Shedd. *Journal of New England Water Works Association*, March, 1904.

The Use of High Pressure Gas on Street Lighting, by J. J. Knight (paper read before Ohio Gas Lighting Association). *American Gas Lighting Journal*, April 11, 1904.

American Street Railway Investments comes to us clearly and handsomely printed, with its maps and 362 pages of information regarding street railway companies. The list covers all companies from the Metropolitan Securities Company, of New York, to the Hawaiian Tramways Company, Limited. Among other things we learn that on April 30, the opening day of the St. Louis Fair, the St. Louis Transit Company carried 927,000 people and the St. Louis & Suburban 94,000.

In a review of the year this useful "Red Book" concludes that as a whole the street railway industry can be said to be in a prosperous condition and developing as rapidly as the condition of the country warrants.

The Journal of the Franklin Institute, Philadelphia, for June, 1904, contains as its leading article a thoughtful paper on *The Utilization and Disposal of Municipal Waste*, by that progressive sanitary engineer of New York City, Wm. F. Morse. Mr. Morse is a member of the Franklin Institute.

The second annual report of the Civic Improvement League of St. Louis contains matter of much interest. The function of the League is to act as the representative citizen of the community.

In Pamphlet No. 11, of the National Municipal League, Secretary Clinton Rogers Woodruff, of Philadelphia, reprints his annual address delivered at the League meeting, Chicago, in April last. The pamphlet is entitled *A Year's Disclosure and Development*.

The South's Supremacy in Cotton Growing is the title of a thirty-six page pamphlet issued by the *Manufacturers' Record*, of Baltimore, in which every phase of the cotton industry and the possibility of the maintenance by the South

of its supremacy in this line are discussed by such men as Edward Atkinson, of Boston; J. C. Hardy, president of Mississippi Agricultural and Mechanical College; D. F. Houston, president of the Texas Agricultural and Mechanical College, and others of similar standing. Price 25 cents.

Corporate Management, by Thomas Conyngton, is a manual for the use of attorneys, corporation officials and all interested in corporations. It is a well arranged work brought up-to-date and will be of great service to all companies, as it is a plain statement of the working details of procedure by a man of experience. Part I is divided into a chapter giving general information about corporations, and a chapter devoted to "the charter." Part II takes up the discussion of "the by-laws," "the stock," "stockholders," "directors," "officers," "dividend and finance," and sundry provisions such as the seal, giving such information about their character, powers, etc., etc., as is desired. Part III has chapters devoted to annual and special meetings of stockholders and directors, and the minutes of meetings, corporation books, and sundry duties of the secretary. Part IV is devoted to "forms" and is very important. These forms include about all that can enter into corporate existence, beginning with a subscription like corporate instruments. Each form is accompanied by explanatory comments and reasons of great value. The corporate laws of New York and New Jersey and a general index conclude the volume. Sheep, 350 pp., \$3, postage 20 cents.

Sewage Disposal, a Resume, Historical and Practical, with Notes and Comments, is the title of a short work by W. H. Knight. The author summarizes the various experiments which have been instituted in the field of sewage disposal, including discharge into sea and streams, irrigation, sub-irrigation and chemical processes, leading up to bacteriological methods. The greater part of the thirty-eight pages is taken up with a description of the various forms which these have assumed; the Exeter septic tanks, contact-beds, Scott Moncrieff's system, and other variations, are concisely dealt with, but the limits of the book do not admit of more than a brief reference to each. Price, paper, 20 cents. spc.

THE Second Quarter, for June, 1904, of the *Central Station List and Manual of Electric Lighting* contains a full and complete report of the Twenty-seventh Convention of the National Electric Light Association, which was held at Boston, and is of interest to all electrical engineers and others connected with electric lighting. This valuable manual also contains an account of the revision of the N. E. L. A. constitution and the U. S. Census Central Station Statistics. The subscription rate is \$4.00 a year.

PART Three of *Tugman's Index to the Manufacturers of the United States*, for 1904, which is at hand, covers the New England States very thoroughly. As a medium that

* Any book or periodical reviewed or mentioned in THE MUNICIPAL JOURNAL or elsewhere, will be sent to any address on receipt of price.

affords representation to each manufacturer it is reliable and authentic. By arranging the manufacturers' catalogues in alphabetical order with the aid of this index they can be consulted at all times without delay or inconvenience.

The Examination of Water and Water Supplies, by John C. Thresh, D. Sc. (Lond.) ; M. D. (Vic.) ; D. P. H. (Camb.), is an important work upon an important subject. When practicing as a water analyst, before becoming a medical officer of health, Dr. Thresh strongly suspected that in deciding upon the character of a water supply far too much stress was laid upon the results of chemical analysis of samples of water and far too little upon the examination of the sources from which they were derived. When, afterwards, the author had the necessary opportunities for examining sources of supply, analyzing the samples of water from such sources, and studying the effect of the water upon health, he was speedily convinced that the examination of the source of supply often afforded far more important information than could be obtained from the analytical results.

The author has also been impressed with the desirability of making more complete chemical analysis of water. Cloth, 8 vol., pp. 460; price, \$2.00; postage, 15 cents extra.

American Problems, by Rev. Joseph A. Vance, pastor of Hyde Park Presbyterian Church, Chicago, the author deals with the problems of the negro, labor, liquor, municipal government and vice. In his essay on municipal problems, Dr. Vance concludes that the redemption of our cities from misrule waits for a generation of men whose civic conscience will measure up to their civic responsibilities. He thinks the growth of the modern city to have been one of the most striking things about the past century. The causes of this growth he attributes to the application of machinery to agriculture, the application of machinery to manufacturing and the application of steam and electricity to transportation. He concludes that unless the evils of the city are speedily met, they will become more aggravated and bring under their baleful sweep the control of the entire country. Cloth, 12 mo., pp. 252. Price, 75 cents, net.

Moody's Manual of Corporation Securities, 1904 edition, being the fifth annual issue of this standard publication, embraces many important features not heretofore included and is an advance over all previous editions. The contents of the new issue are logically arranged under eight sections—each section being practically a volume in itself. Particular effort has been made to elaborate those sections devoted to steam railroads and other public service corporations. The volume contains over 2,400 pages and is well printed in clear type. The complete descriptions of mortgages are supplemented by up-to-date colored maps. Price, bound in cloth, \$10.00; full flexible leather, \$12.00.

Municipal Reports Received

We have received a copy of the report of the Board of Fire-Masters of Charleston, S. C., for 1903.

Chief Harry L. Marston, of the Fire Department of Brockton, Mass., has favored us with his annual report.

A copy of the municipal reports of Alameda, Cal., has come to hand.

The report of the Board of Water Commissioners of Detroit, Mich., for the year ending June, 1903, has been received.

The twenty-sixth annual report of the Board of Health of Lowell, Mass., for 1903, has been sent us.

The twenty-second annual report of the Board of Water Commissioners to the Councils of Bradford, Pa., has received.

Secretary John Caulfield, of the Board of Water Commissioners of St. Paul, Minn., has favored us with the report of that Board.

Mr. John L. Coffin, superintendent of Water-Works and Sewers of Asbury Park, N. J., favored us with his report for 1903.

The report of the Outdoor Playgrounds Committee of the Civic Improvement League of St. Louis has been sent us.

Mr. Andrew Wright Crawford, secretary of the City Parks Association of Philadelphia, has favored us with the report of the Association for 1903, contained in two parts devoted, respectively, to "Proposed Improvements in the City Plan" and the report on "Playgrounds, Squares and Circles, Triangular Parks, under One Acre in Extent."

School Fire Drills at Nutley

PLANS are under consideration for the introduction of fire drills in the public schools of Nutley, N. J., according to a report made to the Board of Education of that place by Superintendent Meredith. He stated that the matter has been under advisement for some time and that the details will be made known as soon as the complete arrangements shall have been made.

His report was made in response to a query from Commissioner Goodrich, who asked if the fire drill had been instituted. The dater stated that he was present at a recent test in New York, when one of the schools was emptied of pupils in short order. The board agreed that its introduction was needed especially at the Park and Yantacaw buildings.

Park to Be Made Around Totem Pole

WHEN the totem pole that stands at the south end of the Tacoma Hotel, Tacoma, Wash., was donated to the city by W. F. Sheard it was understood that the ground around it was to be parked. The matter was allowed to rest for some time, but now the original idea will be carried out. Commissioner Welsh has secured the consent of the owners of the property abutting on Tenth street to park that portion of the street about the totem pole, and cement sidewalks twelve feet in width will be laid on each side of the street, then a twelve-foot roadway on each side with an asphalt surface, the two roads coming together at the east of the strip and turning southerly down to the Eleventh street bridge.

Around the road a cement curb will be laid to mark out the park, and this will be seeded down to grass and planted with trees and shrubs. On the side fronting A street a cement sidewalk will be run out as far as the pole, and outside the A street sidewalk there will be a drinking trough for horses. At each end of the horse trough there will be drinking fountains, cut from a piece of sandstone. The little park will command a fine view of the waterfront and mountains, and seats will be provided, and possibly a small bandstand will be erected.

BITULITHIC PAVEMENT IN THE SOUTH

AMONG the southern cities, Asheville, N. C., proposes to be included in the list of the most up-to-date, which has been lately demonstrated by its attitude on the paving question. In this movement for civic betterment the wealthiest citizens of the community are to be included, as well as the heaviest taxpayers. The city has never been a friend to asphalt, but it has laid a large area of brick pavement in proportion to its size, but the authorities have been impressed with the worth of bitulithic pavement and last fall a contract was made with the Warren Brothers Company for 12,000 square yards of bitulithic pavement and work under the contract was begun in November and continued until December 20th, when unusual cold weather for that section set in, making further progress impossible.

The contractors succeeded in finishing the work of paving Flint

Water and Orange streets. During the progress of the work a citizens' movement for better streets was inaugurated, and the city council was besieged by petitioners asking for improved thoroughfares. The residents of French Broad and Columbus avenues, the two handsomest residential thoroughfares, were the prime factors in the agitation, and in response thereto the city council awarded to the Warren Brothers Company a second contract of 25,000 yards of the bitulithic pavemnt.

This contract is the inauguration of a boulevard project which has for one of its objects the improvement of the principal approach to the city from the railroad station. At present, visitors to Asheville, in passing from the depot to the hotels, are compelled to take what is locally known as the "Scratch Ankle" route, which leads



WATER STREET, ASHEVILLE, N. C., BEFORE BEING PAVED WITH BITULITHIC

street before weather conditions compelled a cessation of activity. For three months work was suspended, and the city suffered one of the most severe winters in its history, accompanied by business depression due to its small number of visitors, the severity of the weather driving tourists farther south.

When the frosts disappeared, the spring rains set and the perfect condition of the bitulithic pavement after its severe winter's test aroused the enthusiasm of the taxpayers, who had also found Flint street the safest for horses in all weather conditions. The completion of the original contract quickly followed in Walnut,

through "Cripple Creek," one of the "red light" districts. When the contemplated improvements have been made, the deplorable impression which a visitor to Asheville now receives will give place to one of admiration.

The effect of the new paving authorized by the city council already has had its effect upon land values in French Broad and Columbus avenues, and a boom in these sections is confidently looked for by the real estate authorities.

When the paving of French Broad and Columbus avenues was under discussion in the city council, the taxpayers of these two



WATER STREET, AFTER BEING IMPROVED WITH BITULITHIC PAVEMENT

streets petitioned for Warren's bitulithic pavement to the exclusion of all others.

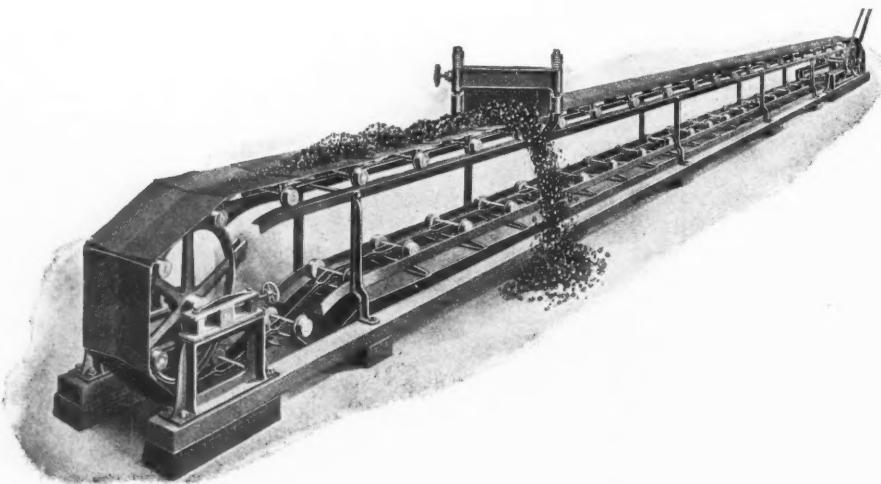
Early this spring the highway department purchased two street flushing machines, and in consequence of their vigorous use the brick pavements in Asheville are in a deplorable condition. The force of the water in many places ripped the bricks from their beds of sand and made the streets in some instances dangerous for travel, and in other cases washed away the foundation, leaving the surface very uneven.

During the year Asheville entertains at its hotels and boarding-houses upwards of 300,000 visitors, and the place is famous for the excellence of the horses at the livery stables, saddle horses being very popular. The brick paved streets have been condemned by the liverymen on account of their slipperiness and danger to riders, and this class of citizens, including the chief of the fire department, are enthusiastic supporters of the bitulithic pavement, which they appear to be unable to praise too highly. The flushing machine had absolutely no effect on the bitulithic pavement, one of its strongest features being its water-proofness.

The city council of High Point, N. C., has awarded to the Warren Brothers Company a contract for 12,000 square yards of bitulithic pavement. Indications point to a very general use of the bitulithic pavement in the South in the very near future, as it appears to meet the full requirements in that section of a permanent pavement.

Triumph Steel Belt Conveyor

THE accompanying illustration shows the patented Triumph Steel Belt Conveyor, made by the C. O. Bartlett & Snow Co., Cleveland, O. It is designed to take the place of rubber or gandy belt conveyors, being very much more substantial and durable. It is made entirely of iron and steel and will last ten times as long as any rubber or gandy belt conveyor. It can be made of almost any size and almost any length desired, requires very little power to drive it and is especially adapted for conveying large quantities of ore,



coal, crushed stone, clay, marl, castings and all kinds of similar materials. As an ore or coal sorting table it has no equal on account of its slow speed, large capacity and durability. The material can be discharged at any place by the discharge plow or it can discharge at the end.

It is constructed of one strand of special chain 24-inch pitch with a working strain of more than 10,000 pounds, fastened together with special steel pins with self-oiling rollers at each end which run on a steel track, usually supported on cast iron strands, although wood supports can be substituted if desired. There is a steel sprocket wheel at each end securely fastened to steel shafts. At the front end are heavy stands with take-up boxes. The drive end has steel countershaft with heavy gears and drive pulley. On each link is fastened a special saddle attachment for supporting the steel belt

which is made in sections 24 inches long and wide enough to give the required capacity, and all bent in a concave or troughing form, (it can be straight if desired), one end being securely fastened to the special saddle attachment, the other end so fastened as to move forward and back, allowing it to pass around the sprockets at the end. These pieces of steel thus forming a continuous steel belt or troughing conveyor.

The Sanitary Situation on the Panama Canal

AN important question connected with the digging of the "big ditch" that is to connect the oceans is the preservation of the health of the workmen, the officials and the resident population. During the period of the French occupancy the mortality among the laborers and on the official staff was very large, owing to neglect of what we now know to be the first of sanitary laws—cleanliness.

But with modern sanitary and preventive measures respecting contamination of food and water supplies and especially the destruction of noxious and dangerous matters, the dangers of infection are reduced to a minimum.

Col. W. C. Gorgas, chief medical inspector, whose work in Cuba was a notable triumph over difficult conditions, after a study of the situation at Panama, says:

"What I propose is to take each village, put it under a systematic scheme of inspection, whereby we shall be able to control all water supplies so that no mosquitoes shall be allowed to breed; look after its street cleaning, and the disposal of night soil, etc., so as to get in good sanitary condition. Then have its population examined and recorded so that we shall have a card history of each individual, and keep track of them in this way."

Admiral Walker, chairman of the Commission, has, through the Quartermaster's Department of the United States Marine Corps, already begun the work of waste disposal at the main camps of the marine battalion, which is to act as guard at the chief points of the work, where the great locks are to be built and the deep cuts made.

There is now ready for shipment a Morse-Boulger garbage and refuse destructor, designed for this particular work, which is to be installed in the camp of the marine battalion on the line of the work.

The Commission has also under consideration a special design for a combined fire closet incinerator and garbage destructor, by which all excrementitious matter is destroyed, without exposure to the air, in a sanitary manner.

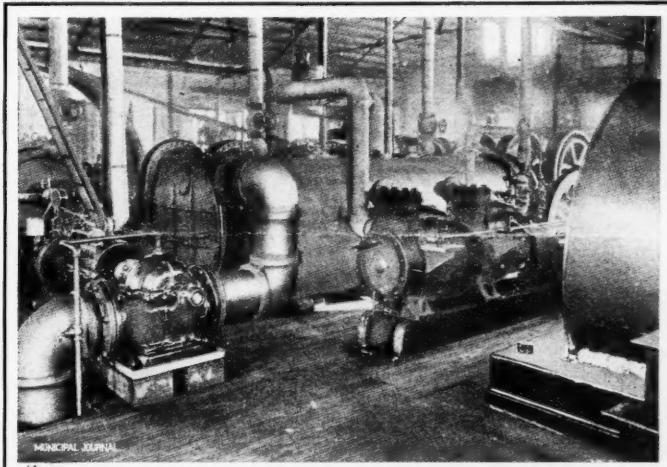
The fire closet was formerly quite extensively used where sewage facilities were not available. The members of the Morse-Boulger Company, then managing the Engle Sanitary and Cremation Company, built and maintained a fire closet at the World's Fair in Chicago, 1893, which was given the highest medal in the award of the exposition for its peculiar efficiency and its satisfactory operation. This is, therefore, an actual and thoroughly tested apparatus, and not merely a theoretical plan on paper.

This fire closet is particularly adapted to the conditions of camps and towns along the canal, and the design submitted by the Morse-Boulger Company will solve an important and vexatious problem, that of the sanitary disposal of excrementitious matter, as well as all garbage and refuse, in a perfectly satisfactory way.

The Morse-Boulger Company, 39 Cortlandt street, New York, has also in hand the enlargement and rebuilding of the Engle garbage crematory built in Panama by the members of this company fourteen years ago. This was the first attempt made by any Central American city to deal with its waste in a sanitary way, and the continuous use of the furnace for fourteen years has, according to the reports of the authorities, been a leading feature of the sanitary work of that city.

The De Laval Turbine Pumps

THE past two years have witnessed the remarkably rapid development of the steam turbine and its application to the driving of electrical generators. The high speed of the turbines makes them particularly well suited for such service, but it is not so well known, however, that the turbines as constructed by the De Laval Steam Turbine Company, of Trenton, N. J., are also well adapted for driving centrifugal pumps. The high efficiency of the steam turbine being



STEAM TURBINE PUMP HANDLING WATER FOR SURFACE CONDENSER AT THE MUNICIPAL ELECTRIC PLANT, JACKSONVILLE, FLA.

ing generally recognized, it will be seen, therefore, that if an efficient centrifugal pump can be combined with a steam turbine, the resulting efficiency of the unit will be high. The De Laval Company has designed and has put on the market centrifugal pumps of exceptionally high efficiency, and of speeds suited to the turbine speeds. In fact, the speeds of the turbines, when applied to pumps, have enabled very high pressures to be obtained with great economy. In general, the turbine pumps produced by this company cover a very wide range of capacities and pressures.

The De Laval steam turbine pump consists of a steam turbine direct-connected by means of a flexible coupling to a centrifugal pump, both turbine and pump being mounted on a common bedplate and sold as a complete pumping outfit.

It is characterized by great simplicity of construction and by the directness of the conversion of the energy in the steam to mechanical power. By means of expanding nozzles the highest degree of efficiency is obtained, the expansion is complete and along the ideal line of highest efficiency. The use of the flexible shaft, invented by De Laval, permits the turbine wheel to deliver its power to a set of highly efficient gears without vibration resulting from the high speed, and the use of the best machine tools has resulted in the production of gears which show practically no wear after years of service.

This pump has many points of superiority over direct-acting steam pumps or centrifugal pumps driven by reciprocating engines. Fuller particulars can be had by addressing the D'Oiler Engineering Company, 119 South Eleventh street, Philadelphia, Pa.

"Stone Making"

UNDER the above caption the Pettyjohn Brothers, Terre Haute, Ind., makers of hollow concrete building block machines—not the makers of the celebrated breakfast food bearing their name—publish a small booklet which will be of especial interest to certain city officials and a large class of contractors. The Pettyjohns graphically describe their machine as "the best, fastest, simplest, and, incidentally, the cheapest on the market. The legend on the title page of this booklet, "Concrete is not the coming age, IT IS HERE," is sufficient proof that they, the Pettyjohns, have an intimate knowledge of their field, which is indicative that they have an expert knowledge of the industry, and, therefore, that they have something of interest and value to the wide-awake city official and contractor.

Items of Interest About the Trade

—THE contract for installing an underground conduit system for the South Bend Electric Company, of South Bend, Ind., has been awarded to G. M. Gest, Broadway Chambers, New York, expert subway contractor. This contract includes all the electrical distribution to service and house connections, covering the main streets of the city. It will be one of the most complete systems thus far installed by any city. The Oliver Chilled Plow Works, of the same place, have awarded a similar contract to Mr. Gest.

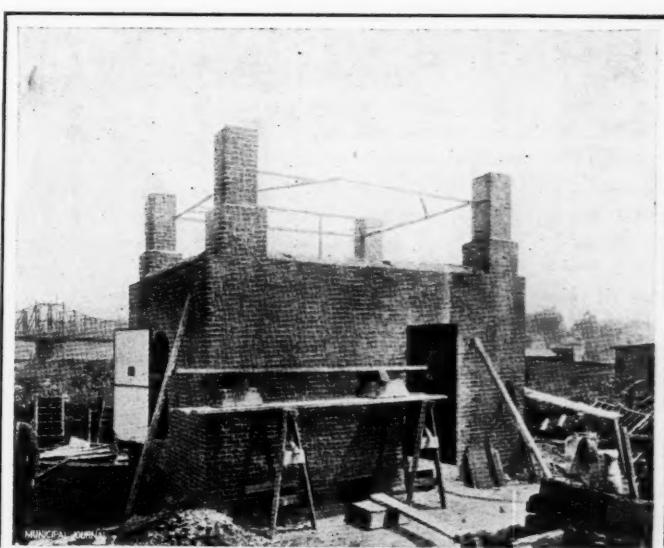
—THE City of New York has just awarded to the United States Wood Preserving Company, of 29 Broadway, New York, a contract for paving Metropolitan avenue, Borough of Queens—about 12,500 square yards—with its creo-resinate wood block, and another contract for over 20,000 square yards in the Borough of Brooklyn. This company also recently secured the contracts for 12,000 square yards of paving in Springfield, Mass., and 5,000 square yards for Main street, Holyoke, Mass.

—THE Toronto Railway Company, of Toronto, Canada, has recently awarded the contract for the construction of its entire subway system, covering the main thoroughfares of the city, to G. M. Gest, Broadway Chambers, New York, the well-known subway contractor. Work will be commenced at once with a large force of men.

New York Test of International System

THE accompanying half-tone shows the results of a test of the "International System" by the New York Building Department. The law requires that before any system of concrete construction can be used in any building within the limits of New York City it must be subjected to rigid tests by fire, water and weight, under the prescribed rules of the department and in the presence of its officials. The official test of the International System is described as follows:

"The floor tested was a 6 ft span, supported on steel I-beams, which were entirely encased in concrete of same proportion as floor. The concrete was composed of one part of good Portland cement, two parts sand and five parts of boiler ashes or commercial cinders. The slab was five inches thick, reinforced with this company's A-tissue. After installing, the slab was allowed to set for thirty days



TESTED AND APPROVED BY THE NEW YORK BUILDING DEPARTMENT

before testing. The test was conducted as follows: For four hours a wood fire was maintained in the room beneath the slab, the average temperature being over 1,700 degrees Fahrenheit. During the fire the floor slab sustained a uniform load of pig iron of 150 pounds to every square foot. At the end of four hours, while still hot, the slab was thoroughly drenched with water under sixty pounds pressure, no defects appearing. On the following day, the load was increased to 600 pounds per square foot, which the floor successfully withstood."

Method of Sewage Disposal

SEWAGE disposal is engrossing municipal attention everywhere just now. Probably there is no question before the public to-day which demands more consideration and is so little understood as the safe and economical disposal of sewage.

The Septic tank system of sewage treatment is the result of a series of experiments carried out by Wm. McDonald Cameron, City Surveyor of Exeter, England, and the United States patents covering the septic tank process and apparatus have been acquired by the Cameron Septic Tank Company, of Chicago.

In March, 1904, suit was commenced by this company for infringement of U. S. patents against the city of Plainfield, N. J., the city

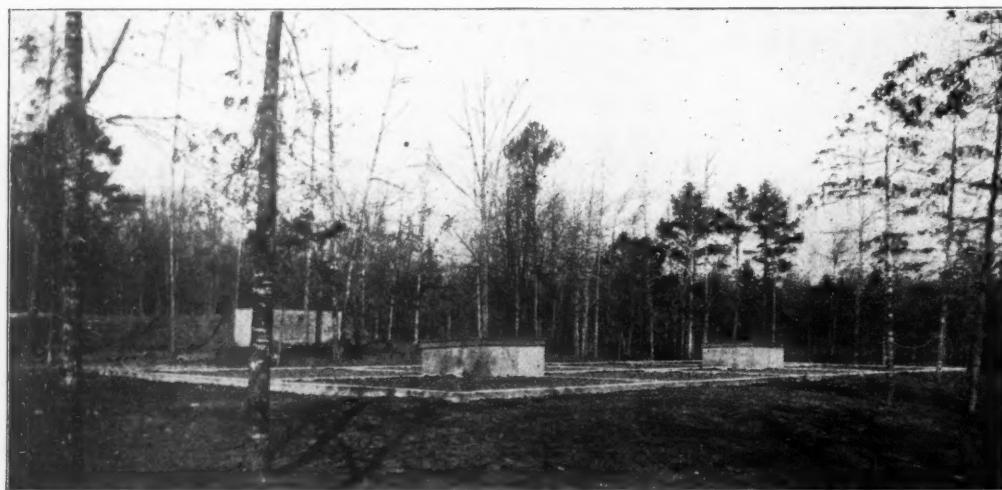
In brief, the advantages claimed by the Cameron Septic Tank System are these: 1. Efficiency with economy. 2. The non-production of sludge. 3. A tank effluent in the best possible condition for either irrigation or filtration. 4. A filtered effluent of great purity. 5. Cleanliness and freedom from nuisance. 6. Automatism in operation. 7. A system within the reach of all communities and practically free from all operating expense.

Huennekens Exhibition at the Fair

THE exhibit made by the H. Huennekens Company, of New York is attracting much attention among clayworkers visiting the Exposition, both on account of its beauty and its comprehensiveness. Not only is the magnificent sand-lime brick arch sufficient to excite admiration, but the complete working model of a sand-lime brick plant is a never failing source of interest.

The Huennekens Company has now twenty-five plants in operation. In 1903 the combined capacity of the Huennekens plant was 15,000,000. In 1904, up to the present time, the capacity has been raised to 150,000,000, and before the end of the year it is expected that a maximum capacity of 300,000,000 brick will be reached. New factories have just commenced operation at Clinton, Ia., Winchester, Ky., and Altoona, Pa., and a number of factories are now under course of construction. Twenty different factories are represented by panel exhibits in the Huennekens World's Fair display.

The Huennekens Company has placed in operation the plant it has erected for the Winchester Granite Brick Company, of Winchester, Ky. F. H. Jackson, the Huennekens representative, organized the brick company and sold the machinery. The company is capitalized at \$50,000. The trial run has been entirely satisfactory, and the brick in appearance resemble white marble. In addition to making and shipping brick, the company will sell sand, having a splendid



CAMERON SEPTIC TANK AT UNITED STATES MILITARY POST, CHICKAMAUGA PARK, GEORGIA

having installed septic tanks regardless of those patents. After careful investigation by expert patent attorneys, the city of Plainfield opened negotiations with the Cameron Septic Tank Company for an amicable settlement, which has recently been effected, and the payment of \$4,000 for a license at the admission on the part of the city of the validity of the Cameron patents.

By referring to the advertisement of this company, which appears elsewhere in this issue, it will be noticed that the company is prepared to furnish plans, specifications and estimates for cities, towns and villages, as well as public institutions and country residences. The company charges its clients no royalty for the use of the patents, and it is claimed that its professional charges are no greater than those of other reputable engineers.

The object of this system is to purify sewage by adopting nature's own methods, thereby avoiding the cost entailed by artificial treatment. The process is to pass the sewage in a tank especially adapted to hasten natural decomposition and to liquify all animal and vegetable solids. These latter being thrown into solution, prevents the formation of sludge and the heavy expense incurred in dealing with it is avoided. The sewer thus freed from solids, passes into a continuous stream from the tank and may be discharged and treated into tidal waters.

With a view of obtaining the best results, the filters installed on this system are fitted with a simple automatic alternating arrangement by which each filter in turn is filled, discharged and treated without attention.

This transformation from crude sewage to pure water is due to the application of natural laws and the indescribable activity of microbes developed under peculiar conditions.



CAMERON SEPTIC TANK AT CLAYTON, ST. LOUIS, MO.

equipment of screening and loading. The officers of the company are: President, F. H. Dudley; vice-president, J. Hood Smith; secretary, J. H. Allen; treasurer, T. G. Barrow. The company's offices are in Winchester, but the factory is located out of town, where there is a mountain of fine white sand.

—The Levi Filter Company, of Charleston, W. Va., has a lot of printed matter that will be of interest to water works officials, councilmanic committees and mayors. It can be had for the asking.

Hand vs. Machine Street Cleaning

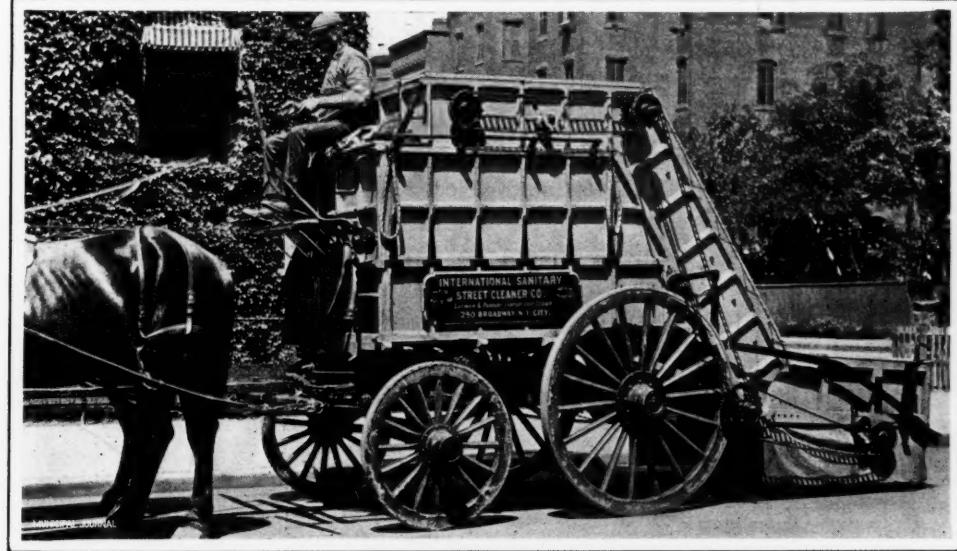
ALL things considered, machine street cleaning is much more economical than hand work. For this reason city officials generally will be interested in anything new in the street cleaning line. Last month the MUNICIPAL JOURNAL drew attention, briefly, to the new machine put on the market by the International Street Cleaner Company, 143 Liberty street, New York, with factory located at Hartford, Conn.

This company is prepared to demonstrate that a material saving over the employment of hand labor can be made by cities which clean their streets with its machine. In the larger cities the saving is likely to reach the large per cent. of one-third, because of the higher price paid for day labor. It is the practice of the company

that it fails to attract the attention of the traveling public while doing its work, and it threads its way in and out between the street traffic with the least possible difficulty.

In the next place, the machine leaves the street slightly dampened and absolutely clean. In performing its work it raises no dust to make life miserable to the travelers of the street, and is noiseless in its action. When the receptacle for the dirt is filled the machine is driven to a side street, where the load of dirt is automatically dumped into an attending cart, with the least possible offense.

Another good point about the machine is that it can be used in winter—when the streets are not covered with snow—as well as in summer, as it is not necessary to sprinkle the streets before cleaning them. City officials or contractors who wish to inquire further into the merits of this model method of cleaning streets will be sure to receive courteous attention at the hands of this company.



THE MACHINE AT WORK CLOSE TO THE CURB

to lease, and not to sell the machines, either to the city or to contractors.

It is interesting to note the contrast between the new and the old methods. For example, by hand labor, to clean the streets of any city requires, comparatively speaking, an army of men. Clouds of dust, laden with disease germs, which not only threaten the health of the city's employees, but that of citizens also, are produced. In addition, piles of dirt and slime are left on the street to await the indefinite arrival of the collector, which often are scattered by the winds and by the street traffic, so that in reality the street is not

strongly suggestive of outdoor life.—*From the Bookseller, News-dealer and Stationer, New York.*

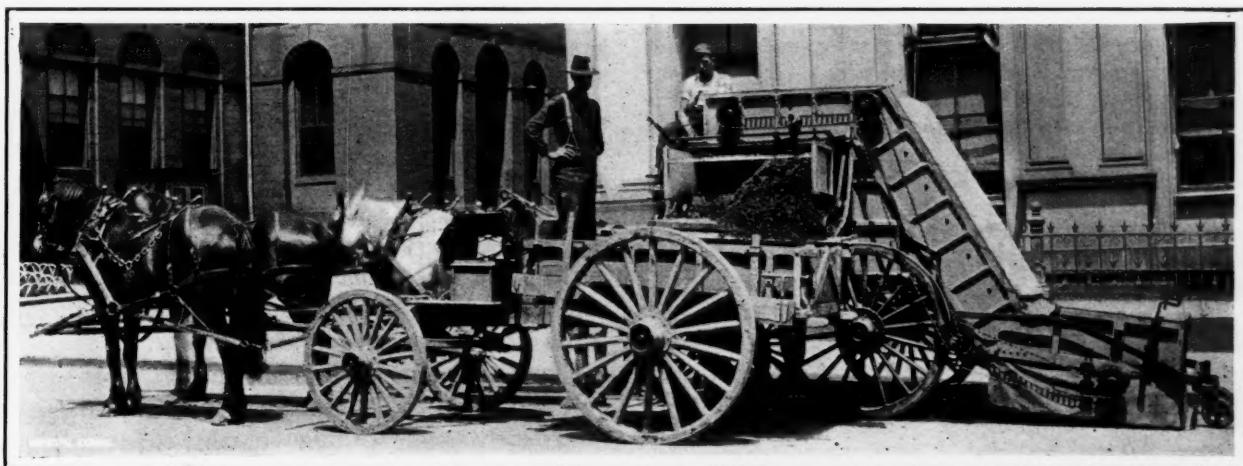
A Splendid Magazine

THE Four-Track News is a magazine that appeals strongly to persons interested in travel, exploration and history; not exploration of new lands, but out-of-the-way, forgotten places that for some historical or other reasons are entitled to remembrance to-day; quaint villages, mountain nooks, hidden lakes and the like are frequently described and illustrated in the pages of this magazine. The reader finds innumerable suggestions for little journeys, and in addition there are articles on subjects of current interest, stories and verse. It is a magazine that should be brought to the attention of readers, especially in the summer, as it is

strongly suggestive of outdoor life.—*From the Bookseller, News-dealer and Stationer, New York.*

Publications Received

—THE International System catalogue "D" is just out and contains a lot of useful information, copiously illustrated, about concrete construction. This system was described in the July number of the MUNICIPAL JOURNAL AND ENGINEER, and a short descriptive article will be found elsewhere in this number. This system is operated by The International Fence and Fireproofing Company, of Columbus, O.



SHOWING HOW THE DIRT IS DUMPED

properly cleaned at all, and, owing to the method employed, is a constant menace to public health.

The machine method—that is, this machine—avoids all of the defects of the hand labor system. In the first place, the machine can be used either day or night without disturbing traffic of any sort. In fact, it is a vehicle which differs so little from an ordinary truck

—THIS is the time of year when all the readers of the MUNICIPAL JOURNAL AND ENGINEER take their vacations. Before deciding on the place to "vacate," it would be wise to send to A. J. Smith, general passenger and ticket agent, Cleveland, O., for the "Book of Trains," which tells of many attractive routes and places connected with the Lake Shore & Michigan Southern Railway.

—THE Great Eastern Clay Manufacturing Company has recently issued a price-list enclosed in a neat celluloid case, which contains, in condensed form, not only the prices but a lot of useful information. By addressing the company at its office, 39 Cortland street, New York, one of these price-lists can be had for the asking.

—UNDER the caption "Devices," the J. B. & J. M. Cornell Company, Twenty-sixth street and Eleventh avenue, New York, has issued a sixteen-page folder which illustrates and describes the steel and bronze bank fixtures, desks and counters, letter and document files, storage and roller book shelving, map files and drawers, and a lot of other devices and fixtures that are indispensable around a well-equipped city hall.

—BULLETIN, Series T, No. 7, has been issued by the D'Oiler Engineering Company, 119 South Eleventh street, Philadelphia, Pa., and can be had for the asking. Besides attending to all mechanical and electrical engineering, this well-known company acts as the agent for the celebrated De Laval steam turbine and electrically driven centrifugal pumps.

—THE Vulcan Iron Works Company, Cleveland, O., manufacturers of steam shovels, dredges, etc., has recently published an up-to-date map showing the territory covered by the Russian-Japanese War, which it will be pleased to send to any municipal official or contractor, free of charge, upon request.

Items of Interest About the Trade

—B. B. Lathbury, associate member American Society Civil Engineers, has severed his connection with the firm of Lathbury & Spackman, as the firm of Lathbury & Spackman has been dissolved. All communications should be addressed to Mr. Lathbury at his office in the Land Title Building, Philadelphia, Pa.

—The Westinghouse Companies at the Louisiana Purchase Exposition extend to all their friends and patrons a cordial invitation to their headquarters in the Palace of Machinery and to their other exhibits in the Palace of Electricity and the Palace of Transportation, up to November 30th, the close of the Exposition.

—THE Diamond Stone Brick Company is rushing to completion its plant at Wilmington, Del., for the manufacture of sand-lime brick, and expects to begin operations in two or three weeks. These brick will be made from the highest grade of silica sand and pure calcium lime. They will stand a crushing strain greater than any clay brick and a greater degree of temperature, while water absorption is guaranteed to be less than twelve per cent. The bricks improve with age, either in the atmosphere or under water, and are unaffected by freezing. They can be furnished in any color or shade; the natural color is a beautiful soft gray, resembling Indiana lime or sandstone. The Charles Warner Company, of Philadelphia, Pa., and Wilmington, Del., will supply the raw materials for manufacturing the brick and will have the general sales agency. Delivery can be made by water to New York, Philadelphia, Trenton and Camden, N. J., Baltimore, Washington, Norfolk and Portsmouth, and by rail to intermediate points.

—THE Wyckoff and Creosoting Company, of Stamford, Conn., has the contract for furnishing creosoted wooden paving blocks to the city of Baltimore, Md., to be used for paving bridges. The city of Baltimore recently completed an experiment with different kinds of pavement, laying them on the approach to a bridge where the traffic is extremely heavy. The creosoted wooden blocks, besides having the advantage of being easy for the horses and noiseless, were found to wear better than any other kind of pavement, which included asphalt, granite block and vitrified brick. Creosoted wooden block pavement is well adapted for use on bridges on account of its weight, which is less than half that of vitrified brick. This difference in weight will amount to several hundred tons on some bridges, making quite a difference in the cost of the steel necessary for the construction of the bridge. The wooden blocks being rectangular, like bricks, instead of round, and being laid with close joints, there is no chance for the fibres of the wood to spread, as with the old style round blocks. When properly and thoroughly treated with dead oil of coal tar wooden blocks are impervious to water, as all the pores of the wood are completely filled with creosote, preventing the entrance of the water.

Water From the Sierras

SOME of the long-headed San Francisco Supervisors who are looking into the future have decided that a conference with Oakland's representatives with reference to a water supply would be a wise proceeding. They realize, as does every thinking man, that San Francisco's supply must ultimately come from the Sierras and they know that when this great work is undertaken Oakland and other cities will be not only willing but anxious to join. Consequently they think it wise to secure what co-operation they can in the preliminaries.

To bring water from the Sierras will be an expensive work, even if undertaken by a city as large and wealthy as San Francisco, and it would be practically impossible for any smaller community. But in union there is strength and a combination of effort will accomplish what would be difficult if not impossible to any individual.

San Francisco's future supply of water will be derived from the snows that fall in the Sierras, and Oakland and other cities along the route will participate in the benefit of an unlimited supply of pure water.

Superiority of Enclosed Arc Lamps

SOME interesting features are to be found in the annual report of Mr. William F. Warner, superintendent of the Electric Light Department of Muncie, Ind. He points out that during the year 1903 the plant was operated 2,833 hours with 234 lamps in operation at the close of the year. The total cash expenditure was \$16,405.25. The amount expended was divided up as follows: New equipment, \$4,047.06; supplies, \$502.35; repairs to engine and equipment, \$1,616.98; fuel account, \$5,522.60; labor, \$4,050.40.

The most important improvement made since the plant was started, which is chargeable to repairs, was the replacing of the old open arc lamps with the "Warner" 9.6 amp. D. C. series enclosed arc lamps. With the new enclosed lamps the light is not only stronger and better, but often every lamp is burning at one time, and the number of lamps out is only about 1 per cent. of what they were with the old lamps in use. The manufacturers said that it was not practical to use enclosed arc lamps on the 9.6 amp. machines without having them rewound, but this plant is running the same old machines without rewinding them, and the service is as good or better than in some places where much money has been spent on new apparatus. With the new lamps in use the engineers' test sheet actually showed a falling off in the line voltage, showing that less power was required to run the enclosed lamps than was necessary to run the old lamps with a large per cent. of them out.

Experience thus far has shown that in order to get the best results from the enclosed lamps that the inner globe must be changed each time the lamp is trimmed, taking the dirty globe back of the station to be cleaned for use next time.

Comparing the expense account for labor and carbons with enclosed lamps in use this year with the same items for last year with open lamps in use, a saving is shown of \$600 on labor and \$711.07 on carbons, or a total of \$1,311.07. This is \$58.99 more than the new lamps cost, the improvement more than paying for itself the first year.

CONTRACT NEWS FOR THE MONTH

Including Paving, Sewerage, Water Supply, Lighting, Public Buildings, Sewage and Garbage Disposal, Fire Supplies, Contracts Awarded

N. B.—All news of proposed work sent us by city officials is incorporated in our Weekly Advance News Service and appears subsequently in this "Contract News for the Month" if the date of the reception of bids be sufficiently late to warrant placing the item here.

City officials and others are urged to send us all news of contemplated improvements for use in our Weekly Bulletins which are mailed to those interested.

PAVING, PAVING MATERIALS AND MACHINERY

Albany, N. Y.—Petitions received for paving Sherman and Third streets and Hudson avenue.

Albany, N. Y.—Will advertise bids soon for paving Sloan street.

Albany, N. Y.—A number of streets to be paved in the near future.

Albany, N. Y.—Prospective road work covers 767 miles of road. State Engrs. office.

Akron, O.—Will issue \$10,300 bonds for street improvements.

Ashland, O.—Resolutions adopted for paving Pleasant and Sandusky streets and Cleveland avenue.

Atlanta, Ga.—Mayor Howell recommends public improvements, grading and paving.

Atlantic City, N. J.—Contemplating the construction of a stone boulevard between Absecon and Somers Point. Board of Freeholders.

Baltimore, Md.—Will probably spend \$200,000 at once for repaving Baltimore street.

Baton Rouge, La.—Will vote soon on \$80,000 paving bond issue.

Bessemer, Col.—Ordinance passed recently granting \$125,000. for street paving.

Birmingham, Ala.—City Engineer will advertise for bids for paving Second avenue. (Brick and Bituminous Macadam.)

Brooklyn, N. Y.—Estimated cost of paving Atlantic avenue is \$245,000. Boro. Pres. Littleton.

Buffalo, N. Y.—May pave Tonawanda street with brick.

Camden, N. J.—\$47,000 appropriated for the Street Committee.

Camden, N. J.—Will repave several streets. Sam. P. Jones, Pres.

Canandaigua, N. Y.—Rejected bids for repaving Bristol street. Will readvertise same for a fourteen foot macadam road pavement. Will call for bids for paving between tracks.

Canton, O.—Will improve Maple avenue and Elizabeth street. W. H. Smith, Mayor.

Cape May, N. J.—Sold \$140,000 improvement bonds.

Celina, O.—Plans preparing for paving Main street.

Cincinnati, O.—Thirty-two streets are to be paved.

Clarksville, Tenn.—Montgomery County endeavoring to secure turnpikes.

Cleburne, Tex.—\$25,000 street improvement bonds voted.

Cleveland, O.—County Commissioners will raise \$240,000 for road improvements.

Cleveland, O.—Will pave and improve many streets.

Columbus, O.—Mayor desires Council to authorize \$60,000 bond issue for street repairs.

Cumberland, Md.—The Mayor wants bids for paving 2,300 feet of streets, with vitrified brick.

Dayton, O.—Will improve Hudson, Homestead and Linden avenues, First street and two alleys. Calvin D. Wright, President, City Council.

Dayton, O.—Will sell \$46,000 bonds for repairing streets. City Council.

Duluth, Minn.—Bids will be asked for nine blocks of macadam roadway on London Road. Will pave 23rd. street.

East Orange, N. J.—\$32,000 appropriated for street improvements. \$1,000 appropriated for Hollywood improvements.

East Rutherford, N. J.—Will readvertise for bids for macadamizing three streets.

East St. Louis, Ill.—Will pave fourteen blocks with brick. Local Board of Improvements.

Elyria, O.—Will pave Middle avenue. Chairman of City Council.

Forth Worth, Tex.—Will improve several streets.

Geneva, N. Y.—Will pave several streets.

Geneva, N. Y.—Will pave Lewis street with brick.

Harrisburg, Pa.—Will grade Woodbine, Curtain and two other streets. \$50,000 appropriated for maintenance and \$450,000 for improvement of roads. 213 miles of roads to be constructed this year in different counties.

Harrisburg, Pa.—Will pave two streets.

Hartford, Conn.—Will establish several new streets.

Hoboken, N. J.—Will improve Sixth street.

Hoboken, N. J.—\$150,000 Hudson Co. bonds for plank road improvement sold at \$101,532.

Holyoke, Mass.—Springfield Road will be widened at Brightside. Will advertise for selected brick.

Indianapolis, Ind.—Extensive street paving and improvements.

Jersey City, N. J.—Preliminary maps filed for paving Lewis avenue and Siedler street. Board Street and Water Comms.

Jerseyville, Ill.—Will reconstruct and pave (brick) fourteen blocks. Board Local Improvements.

Kansas City, Mo.—A number of streets to be improved.

Kansas City, Mo.—Over \$81,000 street and road improvements in parks will be carried out this year. Will buy stone crusher for Swope Park. Will expend \$2,000 on asphalt walks in Observation Park. George E. Kessler.

Kansas City, Mo.—New bids wanted for macadamizing Independence Road near Sheffield.

Kansas City, Mo.—Will pave a large number of streets.

Kenmore, N. D.—Will sell \$9,000 bonds.

Kent, O.—Will pave Main street with vitrified brick.

Lakeland, Fla.—Issued recently \$5,000 bonds for paving. Board Public Works.

Lawrence, Mass.—County Commissioners considering state road from this city to Lowell.

Leaksville, N. C.—Voted \$10,000 bonds recently for street improvements. County Clerk.

Little Falls, N. Y.—Will pave West Main street.

Louisville, Ky.—Will want bids soon for paving Letterle avenue, with brick and asphalt. John H. Weller, Chairman Board Public Works.

Lowell, Mass.—Will pave Middlesex street with granite blocks. Estimated \$41,500. Will macadamize Hampshire street.

Miamisburg, O.—Plans will be drawn for paving South Main street.

Milton, Pa.—Will pave South Front and Filbert streets. W. C. Miller, Town Clerk.

Minneapolis, Minn.—Will lay out streets and sidewalks.

Montgomery, Ala.—Will pave Monroe street. Will probably lay double sidewalks on Adams, Alabama, Goldthwaite and Sayre streets.

Newark, N. J.—Will macadamize Willow avenue.

New Orleans, La.—Will construct granite roadway along river front from Louisiana avenue to Cloutet street. Several other streets may be paved.

Niagara Falls, N. Y.—Will advertise for bids for paving Cleveland avenue.

Niagara Falls, Ont., Can.—Will sell \$18,960 bonds for sidewalk improvements.

Oakland, Cal.—Will probably extend macadam pavement on upper 14th avenue; macadamize Broadway and pave E. 12th street.

Pitcairn, Pa.—Will pave six streets. Estimated cost \$75,000.

- Racine, Wis.—\$5,000 street improvement bonds to be issued.
- Rochester, N. Y.—\$120,000 in paving contracts to be planned and let.
- Rochester, N. Y.—Will improve Shelter street. Estimated cost \$18,000. Will pave Montgomery street with Medina block. Estimated cost, \$7,000. Will improve other streets.
- Rome, N. Y.—City Engineer Schillner has arranged plans for improving streets.
- Rome, N. Y.—Will pave West Willett and Dominick streets. Will turnpike South Jay street. Will advertise for bids for paving East Bloomfield, Court and North George streets. City Engineer.
- Saginaw, Mich.—Ordinance passed to macadamize McCosky street.
- Saginaw, Mich.—Will asphalt Washington avenue.
- Salisbury, N. C.—Will advertise soon for brick pavement.
- Salt Lake City, Utah—Part of Brigham street will be paved and Seventh street will be improved.
- San Francisco, Cal.—Will grade and repave a number of streets.
- Savannah, Ga.—Contemplating 10 miles road work. County Commrs. Chatham Co.
- Springfield, O.—Ordinance passed to pave Lagunda and Locust avenues and Rose street with brick.
- St. Joseph, Mo.—Will brick pave several streets. Frank W. Beach, City Clerk.
- St. Paul, Minn.—Order approved for 15 miles of cement sidewalks.
- Superior, Wis.—New bids wanted for paving Fifth street. New specifications. Board Public Works.
- Tacoma, Wash.—Will improve Anderson street. L. W. Roys, City Clerk. Will pave C. street. To advertise bids for street repairs for 10 years.
- Tacoma, Wash.—Will improve, soon, a number of streets and construct concrete sidewalks.
- Tacoma, Wash.—Will macadamize several streets. Large contracts awarded soon.
- Tampa, Fla.—Decided to bond city for \$500,000 for paving, etc.
- Taunton, Mass.—\$12,000 appropriated for paving Washington street.
- Toledo, O.—Will improve and pave a number of streets.
- Toronto, Can.—City Engineer recommends macadam pavement on Carolina avenue. Also that Crawford street be asphalted, estimated cost \$8,390. Also that Eastern avenue have a macadam roadway estimated cost \$294,200.
- Trenton, N. J.—Cass and other streets will be paved.
- Washington, Pa.—Bids wanted for 75,000 sq. yds. vitrified brick pavement. J. K. Weir, Clerk Council.
- Webb City, Mo.—Petition, for paving Allen street with brick, is being circulated. Mayor George W. Moore.
- West Hoboken, N. J.—\$10,500 appropriated for repairs to streets and sewers.
- Wichita, Kan.—William street and Lawrence avenue will be paved.
- Winnipeg, Man.—Mostyn place will be macadamized. Will construct three boulevards. Will lay granolithic sidewalks on several streets and pave others. C. J. Brown, City Clerk.
- York, Pa.—Will probably macadamize Queen street. Will improve others.
- Youngstown, O.—Will improve Parmalee avenue, Mt. Pleasant and Wade streets. Will pave Spruce street.
- CONTRACTS AWARDED
- Albany, N. Y.—Contract for macadamizing Lancaster street let to Albany Material and Construction Co. at \$15,075. Lowest bidder for paving Alexander street (fire clay blocks) was Mulberry Brothers, at \$1.65 per sq. yd. For paving 3rd and Stephen streets to Mulberry Brothers at \$1.75 per sq. yd.
- Amsterdam, N. Y.—Contract for fire clay brick pavement let to T. Henry Durnay, Albany, at \$20,197.
- Augusta, Ga.—Contract for repaving Broad street to Georgia Vitrified Brick and Clay Company.
- Binghamton, N. Y.—Clinton Street paving contract let to A. L. Willey; South street paving contract let to A. D. Osborn at \$1.73.
- Buffalo, N. Y.—Contract for paving Clinton street to F. & E. Bardol, at \$32,000.
- Butte, Mont.—Contract for paving Main and Galena alleys let to James Welsh at \$3.75 per sq. yd. (Granite Block)
- Canandaigua, N. Y.—Contract for paving seven streets let to Thomas Halahan, Rochester, N. Y.
- Chester, Pa.—Pennsylvania Railroad Company awarded contracts for paving Sixth, Fifth, Madison and Potter streets to Vulcanite Branch of the Barber Asphalt Company. About 8,000 square yards at \$2.35 per square yard.
- Cincinnati, O.—Contract for paving Watson street (brick) let to G. P. Weaver at \$9,404.
- Duluth, Minn.—Contract for improving E. 5th street let to P. McDonnell at \$465,300.
- Findlay, O.—Contracts let: to C. H. Burchinal, Toledo, (Lake Asphalt) for West Sandusky street, at \$23,860; to C. H. Hall & Son, City, for West Front street, at \$16,007.
- Freeport, Ill.—Contract for paving Cherry, Walnut and Upper Stephenson streets, to William Ascher at \$43,000.
- Hamilton, Ohio—Contracts to W. V. Andrews & Co.: Court street (brick) at \$12,414; East High street (brick) at \$56,876; Buckeye street (asphalt) at \$13,059; Ludlow (asphalt) at \$13,356; Front (asphalt) at \$31,548; Heaton (asphalt) at \$63,852; Ross avenue (three inch asphalt block) at \$33,596.50. Contracts to T. J. Mulligan: Riley street, Metropolitan Block (brick) at \$1,505.20; Court (Front to Fourth streets) Metropolitan Block (brick) at \$12,814; Third street, Metropolitan Block (brick) at \$16,590.
- Holyoke, Mass.—Contract for 4000 sq. yds. wood block paving let to U. S. Wood Preserving Company, at \$2.60 per yd.
- Ironton, O.—Contracts aggregating \$40,000, let to T. J. Mulligan.
- Little Falls, N. Y.—Contract for paving West John street and levelling Girvan Square let to Hallinan Bros. (Mack brick) at \$13,400 and levelling at \$698.
- Memphis, Tenn.—City Engineer recommends that contracts be let as follows: Granite paving blocks, E. O. Reagan & Co., granite curbing, curb corners and cross walks, Evans and Davidson; concrete combined curb and gutter, M. Larkin; paving brick, Purrington Paving Co.; granite blocks, Ed. Holly; and macadam, Chickasaw Stone Co., Newson Stone and Quarry Co.
- Norristown, Pa.—Contract for 2 3/8 miles of macadamizing to J. R. Shanley at \$17,450.
- Oswego, N. Y.—Contract for 15,000 sq. yds. of paving, let to John Doyle, Albany, at \$1.92 per sq. yd.
- Ottawa, Ont.—Contract for paving Albert street to Barber Asphalt Company, Toronto, at \$39,187.
- Paris, Ill.—Contract for paving 10th street let to Morrissey & Porter, city, at \$18,816.
- Philadelphia, Pa.—Contracts for asphalt paving let to Barber Asphalt Co., covers 100 streets and aggregates \$800,000. Prices vary from \$1.94 to \$2.04 per sq. yd.
- Scranton, Pa.—Contract let to Barber Asphalt Company for paving Forest Court at \$2.44 and Moir Court at \$2.56 per sq. yd.
- Springfield, Mass.—Voted \$30,000 for wood paving on Main street. Contract to go to the U. S. Wood Preserving Company at \$2.10 per square yard.
- Springfield, O.—Contract for brick paving on High street, to Edward Ryan, at \$10,784.96. Contract for asphalt work to Cleveland Trinidad Asphalt Company, at \$15,290. Contract for paving Mechanic street to W. F. Payne, at \$1,727.02.
- St. Louis, Mo.—Contract for paving Laclede and Easton avenues to Granite Bituminous Paving Company, at \$147,191.
- St. Paul, Minn.—Contract for paving East Ninth street at \$14,120; East Tenth street at \$12,315.50, and Lawton street at \$3,961.10; to Barber Asphalt Company. Contract for paving Rosabel street (brick) to Fielding & Shipley at \$3,150. Contract for grading alley to Nels. Larson at \$1,250.
- Toledo, O.—Contract to Russell & Jennison, for paving Monroe street, at \$131,004.
- Utica, N. Y.—Miller street paving contract to Interstate Paving Company, at \$9,886.02.

PUBLIC BUILDINGS

Alva, Ok. Ter.—Will build court house and jail.

Atoka, I. T.—Voted \$12,000 school bonds. J. D. Langford, Mayor.

Baltimore, Md.—Plans, for the proposed new Eastern High School, will be asked for.

Baltimore, Md.—Plans underway for repairing court house. Estimated cost, \$150,000.

Baton Rouge, La.—Will vote soon on \$25,000 bonds for new school house.

Birmingham, Ala.—Sold \$200,000 school bonds.

Buxton, Ia.—Plans have been prepared for an \$8,000 school building, for Bluff Creek Township, by F. E. Wetherill, Oskaloosa. N. P. Herrington, Clerk.

Camden, N. J.—Contract for the proposed \$700,000 court house has been cancelled because of contest in court about award of contract for heating and lighting, etc. New bids will be asked for.

Camden, N. J.—Will sell \$90,000 bonds for schools.

Canandaigua, N. Y.—\$80,000 bonds have been voted for a new school building.

Chicago, Ill.—\$2,716,000 to be used for school buildings and possibly \$955,000 in addition.

Chico, Cal.—Will readvertise for bids for high school.

Cincinnati, O.—Will issue \$30,000 bonds for public libraries.

Cripple Creek, Colo.—Teller County will erect \$50,000 court house.

Dallas, Texas.—Will issue \$30,000 school bonds. The Mayor.

East Cleveland, O.—Bids, August 6, for high school building, Board of Education, E. Cleveland Village, 201 Cuyahoga Bldg, Cleveland.

Eldorado, Ark.—Plans accepted for 3 story brick school.

Galesburg, Ill.—Bids wanted for \$100,000 high school.

Gilmore City, La.—Plans underway for \$20,000 school.

Guthrie, Ok. Ter.—\$40,000 high school for Logan County, will be built.

Hagan, Ga.—Bonds voted for \$8,000 school.

Halstead, Kan.—Plans underway for a \$20,000 school.

Hattiesburg, Miss.—Will readvertise for bids for \$50,000 bonds for court house.

Janesville, Wis.—Will sell \$13,000 school bonds. A. E. Badger, City Clerk.

Kenmore, N. D.—\$9,000 bonds to be sold.

La Crosse, Wis.—Plans wanted for \$100,000 high school.

Lawton, Ok. Ter.—Bond issue of \$25,000. \$18,000 to go for new city hall.

Lebanon, Va.—Plans wanted for court house and jail for Russell Co. L. L. Bays, Clerk.

Louisville, Ky.—Plans to be prepared for a \$250,000 public library building.

Marshalltown, Ia.—Estimated cost of federal building will be \$100,000.

Menlo, Ga.—Will erect a \$10,000 school building. The Mayor.

Mt. Vernon, Ill.—\$25,000 bonds voted for a new school building.

New Bedford, Mass.—\$200,000 school bonds sold to E. H. Rollins.

New Orleans, La.—Will readvertise for bids for the McDonough school.

New York City, N. Y.—Board of Estimate has authorized \$550,000 bond issue for Bronx Courthouse.

New York City, N. Y.—Mayor approved ordinance to issue \$500,000 bonds for additional buildings for Health Department.

N. Y. City, N. Y.—Plans underway for a \$250,000 school on Prospect avenue. Arch. C. B. J. Snyder, Park avenue and 59th street.

Pell City, Ala.—Will erect \$6,000 brick school. Plans prepared for \$6,000 city hall and jail. The Mayor.

Philadelphia, Pa.—Mayor signed appropriation of \$2,200,000 for schools and school sites.

Pueblo, Colo.—Plans accepted for a new \$300,000 stone high school. Architects: R. S. Roeschlaub & Son, Denver, Colo.

Saginaw, Mich.—County School Comm. J. C. Nafe asks for \$20,000, to be used for 10 new school buildings.

San Angelo, Tex.—Voted \$20,000 school improvement bonds.

Seneca Falls, N. Y.—Plans have been submitted for a State street school building.

Wynnewood, Ind. Ter.—Will erect a \$10,000 school building this summer.

Youngstown, O.—Plans prepared for a new city jail.

CONTRACTS AWARDED.

Ambridge, Pa.—Contract for school building to McDonald & Hartman, Beaver Falls, Pa.

Anniston, Ala.—Contract for school in Ward 5, let to Wolsoncroft & Scarbrough, at about \$9,000.

Armourdale, Kan.—Contract for John Fiske school building to F. W. Taylor, Kansas City, Kan., at \$12,777.

Baraboo, Wis.—Lowest bidder for post office building was Chas. W. Tindele Co., Chicago, at \$39,500.

Berwick, La.—Contract for school building let to Todd & Downing.

Bristol, Va.—Contract for Central school addition let to D. M. Kingsolver, at \$4,034.90.

Butte, Mont.—Contract for addition to Monroe School let to Theodore Hennessy & C. E. Cox at \$6,057.

Charleston, S. C.—Navy yard building awarded to Simons & Mayrant, \$114,783.

Charlottesville, Va.—Contract for post office and court house let to Miles & Bradd, Atlanta, Ga., at \$69,070.

Columbia, Tenn.—Contract for Maury County court house let to R. Hugger & Bro., Montgomery, Ala., at \$83,000.

Crawfordsville, Ia.—H. Inkman, Ft. Madison, received contract for school building at \$8,000.

Dallas, Tex.—Contract for addition to David Crocket School let to Jackson and Wolf at \$7,500.

Eagle Bend, Minn.—Contract for school building to A. G. Wahl, St. Cloud, at \$8,605.

Economy, Pa.—Contract for school building to McDonald & Hartman, Beaver Falls, Pa.

Fort Worth, Tex.—McPherson & Son were the lowest bidders for the new 5th Ward school building at \$22,121 for Malakoff cream white face brick No. 1; \$22,921, same brick, but No. 2; \$22,721, Denton selected kiln run brick.

Gainesville, Tex.—Contract for post office let to L. Stevenson, Dallas, Tex.

Gowrie, Ia.—O. S. Kleveland & Co. awarded contract for school building, at \$11,250.

Guthrie, O. T.—Contract for federal building to Robt. Burke, Hastings, Neb., at \$69,500.

Guthrie, O. T.—Contract for Logan Street High School to Fielding & Strong.

Hagerstown, Md.—Contract for Washington County jail awarded to Pauly Jail Building Co., St. Louis, Mo., at \$38,182.

Hattiesburg, Miss.—Contract for court house and jail at New Augusta, let to McGee & Garber at \$24,258.20.

Hawley, Minn.—Contract for school building to Wefald & Burrill at \$6,808.

Hyattsville, Md.—Contract for high school let to C. C. Wheelock at about \$10,000.

Kingsbury, Ind.—Contract for high school building to Chas. O. Larson, La Porte, at \$10,000.

Kirkhoven, Minn.—Olsen & Skoolheim, Willmar, received general contract for school building, at \$13,500.

Leavenworth, Kan.—Contracts for new buildings at Fort Leavenworth will be let as follows: John W. Wright, Leavenworth, two quartermasters' stables, \$28,590.; one wagon shed, \$11,280.; civilian teamsters' barracks and mess hall, \$10,084.; Mark S. Wright, engineer's storage shed, \$18,124.

Los Angeles, Cal.—Contract for Polytechnic High School let at \$147,397.

Mt. Airy, N. C.—Contract for brick school to T. G. Penn at \$8,900.

Nashville, Ga.—Contract for school building to H. J. Carr & Co., Atlanta, at \$5,000.

Norristown, Pa.—\$50,000 school building contract to Michael F. Mawler, city.

Ozark, Ark.—Contract for Franklin County court house to E. L. Kounze, Warren, Ark., at \$61,000.

Swanton, Ohio—Contract for high school building to F. J. Herman, 824 East Bancroft street, Toledo.

Traverse City, Mich.—Contract for U. S. Post Office and Custom House to Alex. Dawson and J. G. Schmitt, Toledo, O., at \$40,860.

MISCELLANEOUS

Atlanta, Ga.—Purchased Piedmont Park.

Buffalo, N. Y.—Bids soon for bascule bridge over Buffalo River at Ohio street. Span 106 feet. Board Public Works. Forge shop will be erected. Board Education.

Butte, Mont.—Ordinance introduced to place fenders on street cars. Cape May, N. J.—Sold \$140,000 improvement bonds.

Chicago, Ill.—Bids August 24th for deepening West Fork of South Branch of Chicago River. Board Trustees, Sanitary District of Chicago.

Chicago, Ill.—All bids rejected for sewage pumping station for Jackson Park avenue and 79th street. Plans will be revised and new bids called for. Board Local Improvements, No. 207, City Hall.

Cincinnati, Ohio—Sold \$500,000 park extension bonds.

Columbia, S. C.—City Council contemplating street signs.

Columbus, O.—Reported that City Engineer Julian Griggs has completed plans for a sewage pumping station.

Columbus, Ohio—Will erect sewage disposal plant two miles south of city. Estimated cost, \$1,200,000.

Columbus, O.—Bids, August 10, for complete pumping plant for main sewage station. Board Public Service.

Crafton, Pa.—Considering municipal garbage crematory. Chairman Borough Council.

East Orange, N. J.—\$2,100 appropriated for fire proof vault in tax office.

Hoboken, N. J.—May build recreation pier. The Mayor.

Janesville, Wis.—Council passed ordinance for all wires to be underground by August 1, 1909.

Kansas City, Mo.—Considering septic tank installation, Board Public Works.

Kansas City, Mo.—Will complete Swope Park entrance. \$62,000 appropriated for North Park District; \$31,000 for South Park District; \$52,000 for West Park District; \$69,000 for Westport Park District and \$25,000 for Swope Park for crusher, paving, etc. Geo. E. Kessler.

Los Angeles, Cal.—City has undertaken construction of complete system of conduits for electric wires. City Clerk.

Manasquan, N. J.—Plans being prepared for a sewerage system with septic tank.

Minneapolis, Minn.—Will buy park site.

Naugatuck, Conn.—Considering purchase of a spreading wagon for use on borough roads.

Newark, O.—Plans will be prepared for sewer system and sewage purification.

New Orleans, La.—Will rebuild entire wharf system, erect steel sheds over it and purchase a dredge and tug boat.

New York City, N. Y.—Mayor approved ordinance to issue \$275,000 bonds for improving New York Zoological Park.

New York City, N. Y.—\$25,000 appropriated for garbage crematory for Borough of Queens.

Reading, Pa.—Sold bonds for sewer disposal plant improvement.

Rochester, N. Y.—W. C. T. U. presented petition for fifteen fountains to be installed. The Mayor.

Sacramento, Cal.—Will advertise for bids for a garbage crematory. Sanitary Committee.

San Francisco, Cal.—Election Commissioners think of purchasing 40 voting machines. City engineer recommends purchase of three Furnas suction street sweepers.

Santa Monica, Cal.—Will probably vote on \$15,000 park bond issue. Seattle, Wash.—\$210,000 sea wall to be built. City Engineer.

Sioux City, Ia.—Ordinance passed for placing overhead wires underground.

Toronto, Canada—Plot on Bathurst street has been purchased by city for park.

Utica, N. Y.—Considering sewage disposal. Alderman Burke.

West Hoboken, N. J.—\$5,300 appropriated for removal of ashes and garbage.

Youngstown, O.—Park Commissioners will build a dam in Mill Creek.

CONTRACTS AWARDED

Cheyenne, Wyo.—Chas. F. Hendrie, Denver, Colo., was the lowest bidder for garbage crematory, for Fort D. A. Russell, at \$8,200.

Council Bluffs, Ia.—City awarded contract for complete dredging outfit to Bellefontaine Foundry Company, at \$4,800.

Harrisburg, Pa.—Contract for wall around Capital Park to Payne & Company, Philadelphia, Pa. Price about \$500,000.

McKeesport, Pa.—Contract for fifty ton garbage crematory to the Clinton Foundry & Machine Company, New York City, N. Y., at \$12,077.

Newark, N. J.—Contract for Montclair Park work to James Seme, at \$17,959. Essex County Park Commission.

Oakland, Cal.—Contract for street cleaning to Joe Martin at \$6.80 per lineal mile.

Pittsfield, Mass.—Five year garbage disposal contract to Pittsfield Garbage Company, at \$15,000.

WATER SUPPLY

Abbeville, La.—Estimated cost of contemplated municipal water works is \$40,000. The Mayor.

Alpena, Mich.—Will lay twenty-two miles of water mains. Plans being prepared.

Armstrong, Que., Can.—\$30,000 bond issue for water works.

Atlantic City, N. J.—Ordinance introduced for a \$15,000 bond issue for a water main on Atlantic City avenue.

Belding, Mich.—Surveys being made for water works.

Bella Plaine, Ia.—Bids for water mains, etc. will be called for as soon as plans are finished.

Belle Paine, Ia.—Voted \$30,000 water works bonds.

Bennettsville, S. C.—May vote on \$26,000 water bonds.

Bervard, N. C.—Voted \$25,000 bonds for water works.

Bordentown, N. J.—Will sell \$55,000 bonds for new water system.

Brandon, Man., Can.—Bids, August 8th, for pumping engine. City Engineer W. H. Shillinglaw.

Brandon, Man., Can.—Will advertise at once for two 2,000,000 gallon pumps for water works. J. B. Whitehead, City Clerk.

Clinton, O.—Will issue \$100,000 water bonds.

Cardele, Ga.—Will issue \$10,000 bonds for water system.

Clarksfield, Minn.—Will sell \$5,000 water works bonds.

Cleveland, O.—\$114,000 voted by Council for water meters.

Columbus, Ga.—Will have to secure new water supply and erect works at once.

Columbus, Ga.—Permission has been granted city to erect its water works by Judge Newman.

Creemore, Ont.—Voted to issue \$17,000 water works bonds.

Creemore, Ont., Can.—Voted \$17,000 bonds for water works.

Corinth, Miss.—Bonds issued for water works. The Mayor.

Corinth, Miss.—Sold \$60,000 bonds for municipal water works and sewerage system. City Clerk.

Dayton, O.—Supt. Rowe recommends purchase of 800 water meters.

Dublin, Ga.—Will commence at once to build new water works system. Chairman Water Committee.

East Orange, N. J.—\$7,500 appropriated for water purposes.

Ellisville, Miss.—Estimated cost of new municipal water works is \$20,000.

El Paso, Tex.—Will install water works and water system.

Enid, Okla. Ter.—Plans adopted for \$75,000 water supply.

Ensley, Ala.—Will lay new mains.

Fort Dodge, Ia.—Contemplating mechanical filters and expenditure of \$75,000 for pure water. Chairman City Council.

Frederick, Wash.—\$10,000 bonds for water works system to be issued.

- Fredericktown, O.—Voted \$30,000 water works bonds.
- Geneva, N. Y.—Considering enlarging water mains.
- Greenfield, Mass.—Will construct a \$70,000 reservoir at Leyden.
- Grimsby, Can.—\$34,000 bonds, recently voted for water works system. Work to proceed at once.
- Haddonsfield, N. J.—Considering municipal water works.
- Hastings, Pa.—Voted \$14,500 water works bonds.
- Haverhill, Mass.—Water Commissioners recommend new pump at Kenoza Lake.
- Homestead, Pa.—Will vote on \$25,000 bond issue for sand filtration plant.
- Idaho Springs, Colo.—Voted water works bonds.
- Independence, Kan.—Will build new water works. The Mayor.
- Jackson, Miss.—Voted \$250,000 bonds for water works.
- Joliet, Ill.—\$50,000 appropriated for water works.
- Kennard, Neb.—Contemplating water works.
- Lakeland, Fla.—Issued \$15,000 water works bonds. Board Public Works.
- Lake Providence, La.—Will establish a pumping plant. T. J. Powell, Mayor.
- Lawton, O. T.—\$3,000 to be spent on water works.
- Little Falls, N. Y.—Will readvertise for bids for extending water mains.
- Lorain, O.—\$90,000 to be spent for water works improvements.
- Magnolia, Miss.—\$25,000 bonds have been issued for water works.
- Manchester, Va.—Plans received for water works improvement.
- Marshall, Tex.—Will issue \$30,000 water works bonds. The Mayor.
- McKeesport, Pa.—Will vote, Dec. 20th, on issuance of \$350,000 bonds, \$150,000 of which is for filtration plant. Finance Committee of Council.
- Memphis, Tenn.—Suburb, of Lenox, will have water mains.
- Milwaukee, Wis.—Will readvertise for bids for new pumping engine.
- Mobile, Ala.—Voted \$15,000 for additional pumping plant.
- Napa, Cal.—Estimated cost of proposed new water system is \$286,600. M. K. Miller, Engineer, Oakland, Cal.
- Nashwank, Minn.—May construct water works.
- Newark, N. J.—Will lay water main extension on 43rd. street.
- New Orleans, La.—Will lay water main, with necessary pumping machinery, along entire wharf front.
- New York City, N. Y.—Mayor McClellan has approved appropriation of \$1,000,000 for water system improvements.
- Niagara Falls, N. Y.—Estimate for new water works, \$707,300 to \$968,000. Common Council.
- Niagara Falls, Ont.—Will sell \$12,000 water works bonds.
- Norwich, N. Y.—Water Board is to lay a twelve inch water main. Cost, \$15,000.
- Oakland, Cal.—Taking steps to secure municipal water supply jointly with San Francisco, Alameda and Berkeley.
- Onancock, Va.—Bids wanted for a 50,000 gallon water tank, mains, hydrants, etc. Town Clerk.
- Ospelousas, Ky.—Considering addition to water works.
- Pittsburg, Pa.—Voted \$5,000,000 bonds, July 12th, for water purification.
- Pittsburg, Pa.—Considering purchasing \$600,000 water meters.
- Portage La Prairie, Man., Can.—Will lay out new water works.
- Port Arthur, Ont., Can.—Will sell \$85,000 water works bonds.
- Quincy, Ill.—May purchase local water works at \$649,159. The Mayor.
- Racine, Wis.—Will extend water mains. The Mayor.
- Rahway, N. J.—Will sell \$30,000 filter plant bonds.
- Ringstead, Mich.—Water works contemplated.
- Rochester, N. Y.—Considering extension of large distributing water mains.
- Rock Hill, S. C.—Contemplating municipal water works.
- Russellville, Ky.—Bids wanted for municipal water works. Patrick Ryan, Chairman of Committee.
- Saginaw, Mich.—May lay new water main.
- Salem, Ill.—Plans prepared for a \$30,000 water works.
- Salem, Ill.—Propose water works at \$30,000.
- Santa Monica, Cal.—\$150,000 bond issue recommended for municipal water and light plants.
- Sherman, Tex.—Will buy water works machinery.
- Sherodsville, O.—Propose water works at \$15,000.
- Shippensburg, Pa.—Ordinance, recently passed, for \$12,000 to be spent for water pipes. Town Council.
- Springfield, Ill.—Mayor recommends driving twenty wells.
- Springfield, Mass.—Bids will be asked for new reservoir.
- Springfield, Tenn.—Plans being prepared for water works.
- St. Paul, Minn.—Will improve water mains.
- Stratford, Ont., Can.—Will probably extend water works.
- Timmonsville, S. C.—Estimates wanted for a municipal water works. A. J. Brown, Town Secretary.
- Thompson, Ga.—Will issue bonds for water system.
- Traverse City, Mich.—Recently voted to issue \$20,000 bonds for water service extension.
- Troy, Tenn.—Will install water works. The Mayor.
- Union, S. C.—Contemplating larger water supply.
- Wellsburg, W. Va.—\$12,000 water main extension bonds reported sold.
- West Hoboken, N. J.—\$1,000 appropriated for hydrants.
- Wharton, Tex.—Plans being prepared for water works system. Bonds have been sold.

CONTRACTS AWARDED.

Bloomington, Ill.—Contract for water mains on State and East Washington streets to O. W. Dunlap, at \$14,161.

Bozeman, Mont.—Contract for 26,000 feet of sixteen inch water mains and supply of fourteen, twelve, ten, and eight inch pipe, to Washington Pipe & Foundry Company, Tacoma, Wash., at \$35,000.

Carrollton, Miss.—Contract for water works to F. H. Porter, Clinton, Ky., at \$11,000.

Colfax, Wash.—Contract for gravity filter plant to Wm. B. Scaife & Sons Co., Pittsburg, Pa., at \$3,563.

Erie, Pa.—Contract for extension of intake pipe to T. A. Gillespie Company, Pittsburg, at \$195,968.58.

Hillsboro, N. D.—Contract for water mains to Jas. Kennedy, Fargo, at \$61,710.

La Crosse, Wis.—Contract for laying six inch water main, let to Cavanaugh & Smith at \$1,483.50.

Mangum, O. T.—Contract for water works system to B. F. Evans, at \$29,000.

Morrisonville, Ill.—Contract for water tower to W. E. Caldwell & Company, Louisville, Ky., at \$3,370.

Perth Amboy, N. J.—Contract for laying two sections of twenty-four inch water main, to Cruse Construction Company, city, at \$62,344. Contract for the third section to McGovern Construction Company, Newark, N. J. at \$15,980.

Poughkeepsie, N. Y.—Contract for repaving to Cruse Construction Company, Perth Amboy, N. J., \$45,844.

Rockwell City, Ia.—Contract for municipal pumping plant to Smedley Steam Pump Works, Dubuque, at \$2,850.

Shinnston, W. Va.—Contract for water system to H. C. Brooks, Fairmont, W. Va., at \$9,475.

Spokane, Wash.—Contract for laying cast iron water mains on 47th avenue and Boylston avenue to Bell & Price at \$47,096 and \$8,295 respectively.

St. Louis, Mo.—Gilsonite Construction Company was lowest bidder, at \$232,809 for covered reservoir at Baden Station.

Utica, N. Y.—McKeough Danquer Plumbing Company were lowest bidders for furnishing 50 fire hydrants at \$24.00 each.

SEWERS

Albany, N. Y.—Will call for bids for sewer in Hurlburt street.

Augusta, Ga.—Will put in sewer extension on a number of streets. W. J. Campbell, City Clerk.

Baton Rouge, La.—Will vote soon on \$25,000 sewer bond issue.

Bayonne, N. J.—Will build sewers in several streets. W. C. Hamilton, City Clerk.

Belding, Mich.—Surveys being made for a sewer system.

Bellington, W. Va.—Contemplates sewers. The Mayor.

Beloit, Wis.—Considering a \$25,000 sewer extension in the Fifth Ward.

Butte, Mont.—Bids wanted for sewer on Kemper avenue.

Camden, N. J.—Will sewer Haddon avenue and 12th street.

Cape May, N. J.—Sold \$140,000 improvement bonds.

Chicago, Ill.—May advertise for bids for completion of Lawrence avenue intercepting sewer, 12,817 feet of tunnel. Estimated cost \$650,000.

Cincinnati, O.—Will extend sewers on Clifton avenue.

Clare, Mich.—Arranging for the installation of a sewer system. Columbus, O.—Will call for bids for pipes for proposed sewage disposal plant, Amount \$118,000.

Corinth, Miss.—Sewerage system bonds issued. The Mayor.

Corning, N. Y.—Will lay an eight inch sewer on Bridge street. Chairman Sewer Committee.

Cuyahoga Falls, O.—Will bond town \$80,000 for sewer system.

Dallas, Tex.—Bids will be asked for sewerizing several streets. City Engineer.

East Orange, N. J.—\$4,200 appropriated for sewers.

Holyoke, Mass.—Plans to be prepared for the Highland sewer system. Will improve Springdale sewer system.

Houston, Tex.—Will probably vote on bond issue for sewers.

Hartford, Conn.—Will sewer several streets.

Janesville, Wis.—Several sewers will be constructed in the course of the year.

Lansing, Mich.—Planning to construct Price's Creek sewer in First Ward. Estimate cost \$27,930. Also planning to construct several sewers for Third Ward.

Marion, S. C.—Voted sewerage bonds. The Mayor.

Marshall, Tex.—Will issue \$45,000 sewerage system bonds. The Mayor.

McKeesport, Pa.—Sewers recommended for Fawcett, Library, Beach and other streets.

Memphis, Tenn.—Suburb of Lenox to install sewer system.

Millers Falls, Mass.—\$4,000 voted for sewers.

Minneapolis, Minn.—Will sewer Colfax avenue.

Mountain Creek, Ala.—Plans are preparing for sewerage system for Home of Confederate Veterans.

Newark, N. J.—Will install sewers in S. 14th street, S. 11th street, Shipman, Augusta and Nicholson streets, Landers alley and Montclair and Grafton avenues.

Niagara Falls, Ont.—Will sell \$15,828 bonds for sewers.

North Dunkirk, N. Y.—Agitating for a sewer system to be placed in First and Fifth Wards.

Oakland, Cal.—Will sewer 8th street. Chas. F. Ott, Superintendent of Streets.

Port Arthur, Ont., Can.—Will sell \$62,000 sewer bonds.

Reading, Pa.—Will spend over \$1,500,000 on sewers this year.

Rochester, N. Y.—Will issue \$100,000 bonds for East side trunk sewer. Will sewer St. Paul and Whitney streets. Estimated cost \$5,500 and \$750 respectively.

Rock Hill, S. C.—Contemplating sewer system.

Rome, N. Y.—Will sewer West Willett street.

Salisbury, Md.—Contemplates sewerage system.

South Bend, Ind.—Petitions in for sewerizing S. Main and Robinson streets.

St. Paul, Minn.—May limit bond issue to \$100,000. Bulk of it for sewers. Controller.

Utica, N. Y.—Will extend sewer on South Hamilton street.

Vacaville, Cal.—Will vote soon on bond issue for sewer system.

West Carrollton, O.—Grading Main street for proposed sewer.

Winnipeg, Man., Can.—Will sewer Schultz street; Portage avenue, estimate \$12,317; Corydon avenue estimate \$1,580; Rover, Edward and Minnie streets, estimate \$4,238; Grove street, \$2,045 and Aberdeen avenue, estimate \$3,930. C. J. Brown, City Clerk.

Woonsocket, R. I.—\$10,000 additional to be spent on sewers.

CONTRACTS AWARDED.

Ashtabula, O.—N. D. Eichenlaub, reported to have received contract for sewer extension on South Main street, at \$4,454.

(Continued on page 33.)

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Construction Superintended

Binghamton, N. Y.—Engineer Rudolph Herring, New York City, engaged to lay out proposed 4th Ward sewer.

Centralia, Ill.—Contract for sewage system to D. W. Norton & Co., Vincennes, Ind., at \$36,427.

Danville, Ill.—Chas. Cottingham awarded contract for storm water sewer at North End, at \$29,000.

Duluth, Minn.—Contract for West 3rd street sewer let to M. Fitzgerald at \$1,406.50. For sewer in East 6th street to Peter Johnson at \$406.64.

Elmira, N. Y.—Contract for Walnut and West Second street sewers let to P. H. Costello.

Lawton, Okla. Ter.—Contract for sanitary sewer to Jos. Sevens, Guthrie, at \$32,199.06. Taylor & Moore, Houston, Texas, received contract for partial storm sewer at \$14,904.21.

Memphis, Tenn.—City Engineer recommends that contract for sewer pipe be let to John A. Denies' Sons.

Oakland, Cal.—Contract for storm sewer on E. 14th street and 22nd avenue, let to E. B. & A. L. Stone Co.

Omaha, Neb.—Contracts: to Zack Cuddington, the Clifton District sewer No. 292 at \$11,214; to J. F. Dailey the Omaha District sewer No. 293, at \$10,083; to J. P. Connolly extending Saddle Creek sewer No. 294, at \$5,177.

Oneida, N. Y.—Contracts for sewers in three streets let to A. W. Fitch, Oneida. For sewer on Wilber and Walnut streets and Washington avenue, to G. W. Miller & Co.; for main sewer Washington avenue, not let. Bids too high.

Pine Bluff, Ala.—Contract for sewer extension in Sewer District No. 3 to Dunnegan & Sykes, Shenendoah, Ia., \$31,733.40.

Prescott, Ariz.—Contract for sewer at Whipple Barracks to Fifield & Gallagher, Phoenix, at \$9,763.

Sioux City, Iowa—Contract for West 14th street sewer to F. J. Sulzback, at \$11,000 nearly.

Schenectady, N. Y.—Brandywine sewer contract let as follows: U. S. Iron Pipe & Foundry Co., for pipe at \$23.90 for 4 in.; \$22.90 for 6 in.; \$22.90 for 8 in.; \$22.40 for 16 in.; \$48 per ton for castings; total \$2,351.28. Schenectady Construction Co. for laying same at \$.90 per linear foot sewer laid, \$1.00 per sq. yd. rock excavation; Rensselaer Mfg. Co., valves and appurtenances at \$6.85 for 4 in. valves; \$11.90, for 6 in. valves; \$17.25 for 8 in. valves; \$3.00 per valve box and \$22.25 for hydrants. Total, \$725.

Spokane, Wash.—P. Costello was lowest bidder for 1st Ward sewer, at \$59,800.

Washington, D. C.—Contract for putting cast iron sewerage system in Treasury, to Jas. F. Nolan & Sons, at \$25,436.

LIGHTING

Aberdeen, Md.—Voted \$8,000 electric light plant bonds. The Mayor.

Atwater, Minn.—Voted to construct electric light plant. O. H. Larson, Village Recorder.

Boone, Ia.—Municipal electric light plant contemplated. Estimated cost \$20,000. T. L. Jones, City Clerk.

Chicago, Ill.—Bids, August 31, for turbines, governors, etc., for Lockport power of the Sanitary Ship Canal. Engineering Department Sanitary District, Security Building, Chicago.

Cincinnati, O.—A \$10,000 electric light plant is contemplated for workhouse. Board Public Service.

Columbus, O.—Ordinance passed to issue \$70,000 bonds for city pole line.

Covington, Ky.—\$75,000 has been authorized for an electric light plant.

Decatur, Ala.—Contemplating a municipal electric light plant. H. A. Skeggs, Mayor.

East Orange, N. J.—\$38,000 appropriated for street lighting.

Fayetteville, N. C.—Considering enlargement and improvement of electric light plant.

Fond du Lac, Wis.—Will vote on municipal electric light plant. Village Board.

Front Royal, Va.—Voted \$15,000 electric light plant bonds.

(Continued on page 34.)

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Hamilton, O.—Board Public Service asks for \$25,000 for gas plant repairs.

Hawarden, Ia.—\$6,000 will probably be used to repair electric light plant.

Ithaca, Mich.—\$13,000 voted for electric light plant.

Jasper, Ind.—Sold \$12,000 electric light bonds

Kalamazoo, Mich.—Recently voted \$20,000 bonds for electric light plant improvements.

Kingston, Ont., Can.—Will sell \$122,000 electric light plant bonds.

Kissimmee, Fla.—Will probably issue \$19,370 bonds for enlarging electric light plant.

Knoxville, Tenn.—Lighting Committee recommends establishment of municipal electric light plant. Estimated cost, \$137,900.

La Grange, Ga.—Will vote on \$25,000 electric light bond issue.

Lakeland, Fla.—City has issued \$12,000 electric light bonds. Board Public Works.

Lake Providence, La.—Will establish an electric light plant. T. J. Powell, Mayor.

Lakeville, Conn.—Electric light plant of Hotchkiss School, which was burned, will be rebuilt at once.

Little Falls, Minn.—Contemplating issuing \$10,000 municipal electric light plant bonds.

Louisville, Ga.—Has voted bonds for an electric light plant.

McKinney, Tex.—Voted \$8,000 bonds for electric light plant.

New Albany, Miss.—Will issue \$20,000 bonds for electric light plant.

Norton, Kan.—Considering electric light plant.

Port Angeles, Wash.—Reported that Council passed appropriation of \$14,000 bonds to continue construction of electric light plant.

Rock Hill, S. C.—Contemplates a municipal electric lighting plant.

Saginaw, Mich.—Preparing plans for municipal electric light.

Santa Monica, Cal.—May issue \$150,000 bonds for municipal water and light plants.

Sioux Rapids, Ia.—Will either buy local electric light plant or erect one. Council Committee.

Springfield, Tenn.—Engineer secured for new light plant. Bids wanted soon.

Spring Valley, Wis.—Plans prepared and adopted for electric light plant.

St. Ignac, Mich.—Will rebuild electric light plant at once.

St. Joseph, Mo.—Will issue \$75,000 electric light bonds.

Tacoma, Wash.—Voted \$8,590 to rearrange the arc lighting system. Board Public Works.

Thompson, Ga.—Will issue bonds for electric light system.

Timmonsburg, S. C.—Estimates wanted for municipal electric light plant. A. T. Broom, Secretary.

West Hoboken, N. J.—\$15,800 appropriated for public lighting.

White Bird, Idaho—Will enlarge electric light plant.

Whitehall, Mich.—Voted electric light plant enlarging bonds.

Wilton Junction, Ia.—Will improve electric light system. W. D. Harris, Town Clerk.

CONTRACTS AWARDED.

Hamilton, O.—Contract for furnishing city with arc light carbons, for one year, to Consumers Carbon Company, Lancaster, is dated April 13, 1904.

Syracuse, N. Y.—Court House Committee received bids for power house on Cedar street. Lowest is from Henry Ryan at \$90,800.

Woodville, Miss.—Contract for electric light plant let to O. J. Gorman & Co., Dallas, Tex.

FIRE DEPARTMENT SUPPLIES

Argo, N. D.—Contemplating paid fire department.

Auburn, N. Y.—Manufacturers of West End want another fire company.

Auburn, Wash.—Considering purchase of chemical engine.

Bay City, Mich.—Fire Commission wants \$32,000 this year. \$5,000 of this to be used for aerial truck.

Bay City, Mich.—Plans for \$5,000 repairs and reconstruction to Fire Station, Washington avenue, have been drawn.

Berkeley, Cal.—Agitating for new fire apparatus.

(Continued on page 35.)

THE BEST MUNICIPAL BOOKS

Sewers and Sewage

SEWAGE AND BACTERIAL PURIFICATION OF SEWAGE. Methods of disposal, etc. Samuel Rideal, D.Sc. (English.) 278 pp. \$3.50.

SEWERAGE. Design, construction and maintenance of sewer systems. A. Prescott Folwell. 445 pp., illus. \$3.00.

SEWAGE DISPOSAL. Methods of disposal and purification. Wyncoop Kiersted. 182 pp. \$1.25.

SEWER DESIGN. Treatise on sewer construction. H. N. Ogden. 234 pp., illus. \$2.00.

SEWERS AND DRAINS FOR POPULOUS DISTRICTS. Rules and formulas for dimensions and construction. J. W. Adams. \$2.50.

PURIFICATION OF SEWAGE. Scientific principles of sewage purification and their application. Sidney Barwise. (English.) Illus. \$2.00.

CLEANING AND SEWERAGE OF CITIES. Translated from the German. R. Baumeister. Illus. \$2.00.

SEWAGE WORKS ANALYSES. Methods of analysis used in laboratory of Manchester Sewage Works, England. Gilbert J. Fowler. 128 pp., illus. \$2.00 net.

PURIFICATION OF SEWAGE AND WATER. W. J. Dibdin. (English.) 2d Edition. Illus. 379 pp. \$6.50.

SEWAGE DISPOSAL IN THE UNITED STATES. G. W. Raftel and M. N. Baker. Illus. \$6.00.

SEPARATE SYSTEM OF SEWERAGE. Theory and construction. Cady Staley and G. S. Pierson. Illus. \$3.00.

SEWERAGE AND LAND DRAINAGE. Geo. E. Waring, Jr. Illus. \$6.00.

MODERN METHODS OF SEWAGE DISPOSAL FOR TOWNS, PUBLIC INSTITUTIONS AND HOUSES. Geo. E. Waring, Jr. Illus., 260 pp. \$2.00.

SEWERAGE AND SEWAGE PURIFICATION. M. N. Baker. 50 cents.

THE TREATMENT OF SEWAGE. Dr. C. Meynott Tidy. 50 cents.

ELEMENTS OF SANITARY ENGINEERING. Mansfield Merriman. 222 pp. \$2.00.

Roads and Pavements.

HIGHWAY CONSTRUCTION. Treatise on construction and maintenance of roads, streets and pavements. A. T. Byrne. 895 pp., illus. \$5.00.

TEXT-BOOK ON ROADS AND PAVEMENTS. Country roads and city streets. F. P. Spalding. 213 pp., illus. \$2.00.

STREET PAVEMENTS AND PAVING MATERIALS. Methods and materials of city street construction. George W. Tillson. 496 pp., illus. \$4.00.

ROADS AND PAVEMENTS. Paving materials and pavement construction. Ira Osborn Baker. 600 pp. Illus. \$5.00.

CITY ROADS AND PAVEMENTS. William Pierson Judson. 186 pp., illus. \$2.00.

ROADS: THEIR CONSTRUCTION AND MAINTENANCE. Special reference to road materials. Allen Greenwell and J. V. Elsdon. (English.) 280 pp., illus. \$1.50.

ECONOMICS OF ROAD CONSTRUCTION. A short practical treatise. Herbert P. Gillette. 41 pp., illus. \$1.00.

PRACTICAL TREATISE ON THE CONSTRUCTION OF ROADS, STREETS AND PAVEMENTS. Gen. Q. A. Gilmore. Illus. \$2.00.

NEW ROADS AND ROAD LAWS IN THE UNITED STATES. Gen. Roy Stone. Illus. \$1.00.

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See other lists elsewhere.

Bessemer, Ala.—The Mayor's request for a reel of two hundred and fifty feet fire hose and a station will be acceded to. Volunteer fire company will be organized in South Bessemer. Chief Nolan, Bessemer.

Buffalo, N. Y.—\$3,500 appropriated for fire house and stable supplies. Fire Commissioners.

Calgary, N. W. Ter., Can.—Voted \$4,000 for new fire house.

Camden, N. J.—City Council has passed on the issuance of \$25,000 bonds for additional fire fighting equipment.

Cincinnati, O.—Will issue \$325,000 bonds for fire department. Will procure fire-boats, fire-engines, water-towers and buildings.

Clinton, Ia.—Resolution to buy new hook and ladder truck. James Peterson, Mayor.

Columbus, Ga.—Voted \$40,000 improvement bonds; \$20,000 to be spent for fire department, for new engine, a combination chemical hose wagon and fire alarm system.

Council Bluffs, Ia.—Will advertise for combination chemical hose wagon and 1,000 feet fire hose.

Dayton, O.—\$20,000 bonds will be issued for fire cisterns.

Dixon, Ill.—May build new fire house.

Dover, N. J.—\$2,000 appropriated, by Council, for fire alarm system.

Eagle Pass, Tex.—Will secure fire fighting equipment. Wm. Douglass.

East Rutherford, N. J.—Will establish Gamewell fire alarm system.

Elkins Park, Pa.—Old York Road Fire Association organized. Will want \$10,000 fire house.

Elyria, O.—Plans prepared for a fire station.

Glenville, O.—Considering fire department improvements.

Grand Rapids, Mich.—Will buy aerial fire truck and steamer.

Hartford, Conn.—May spend \$125,000 to improve fire department.

Hudson, N. Y.—Fire Commissioner recommends combination chemical hose wagon.

Ithaca, N. Y.—Needs 1,000 feet fire hose.

Jackson, Mich.—New paid fire department needs equipment.

Jersey City, N. J.—\$10,500 appropriated for fire house.

Jonestown, Pa.—Funds being raised for purchase of chemical engine.

Kansas City, Mo.—Sites have been selected for new fire headquarters and two engine houses.

Kansas City, Mo.—Will advertise for large fire engine, 80 foot hook and ladder truck and 10,000 feet fire hose.

La Grange, Ga.—Will vote on \$5,000 bond issue for fire department.

Lancaster, N. C.—Will organize a fire department.

Lansing, Mich.—\$15,000 bonds voted for fire engine house.

Lawton, Okla. Ter.—Has \$4,000 for fire company.

Los Angeles, Cal.—Will secure seven combination hose and chemical wagons in near future. Fire Commissioners.

Marietta, O.—Board of Public Safety considering fire department improvements.

Memphis, Tenn.—Needs at least three new fire engines.

CONTRACTS AWARDED.

Butte, Mont.—Contract for addition to Quartz street fire station let to M. E. Welch at \$1,120.

Burlington, N. J.—Contract for 1,300 feet fire hose let to United and Globe Rubber Company, Trenton, at \$.59 per sq. ft.

Cleveland, O.—Contract for No. 6 engine house let to Jacob Slade.

Cleveland, O.—Nott Fire Engine Company was the lowest bidder for Doan street fire engine at \$4,750.

Council Bluffs, Ia.—Contract for new fire station awarded to Iowa Consolidated Construction Company.

Dallas, Tex.—Will buy from Gamewell Fire Alarm Telegraph Company: five fire alarm boxes, one hundred and six glass key guards and one hundred storage batteries, at \$1,140.

Hartford, Conn.—Contract for reconstruction of house (Engine No. 4) let to Thomas Malcolm at \$2,425.

Kansas City, Mo.—Contract for 10,000 feet fire hose let to English Iron Works at \$.725 per foot. For 1,000 feet rubber hose to Mercantile Lumber and Supply Company at \$1 per foot.

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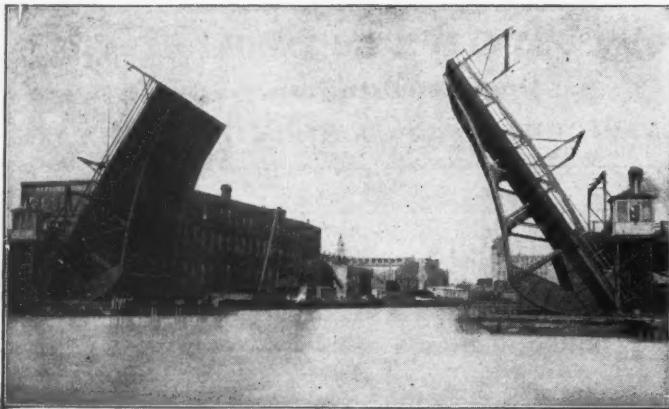


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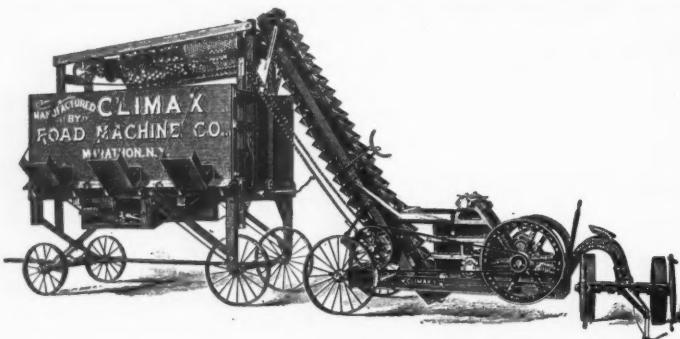
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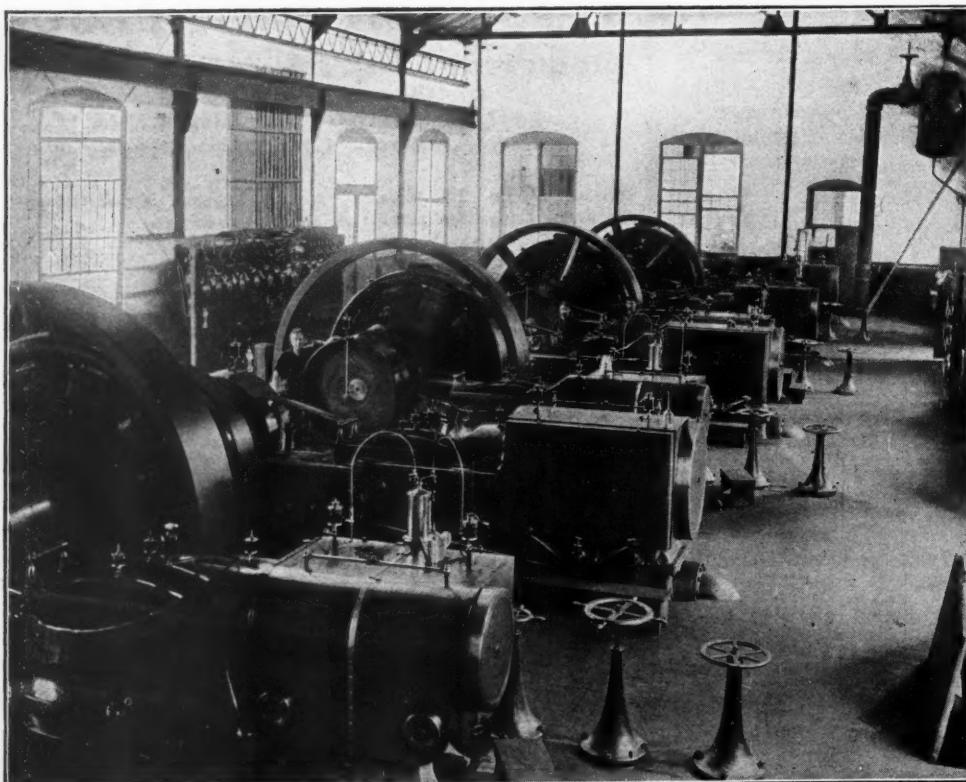
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